THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

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Aerial view of Arizona Rock and Sand Co., Phoenix, Ariz.

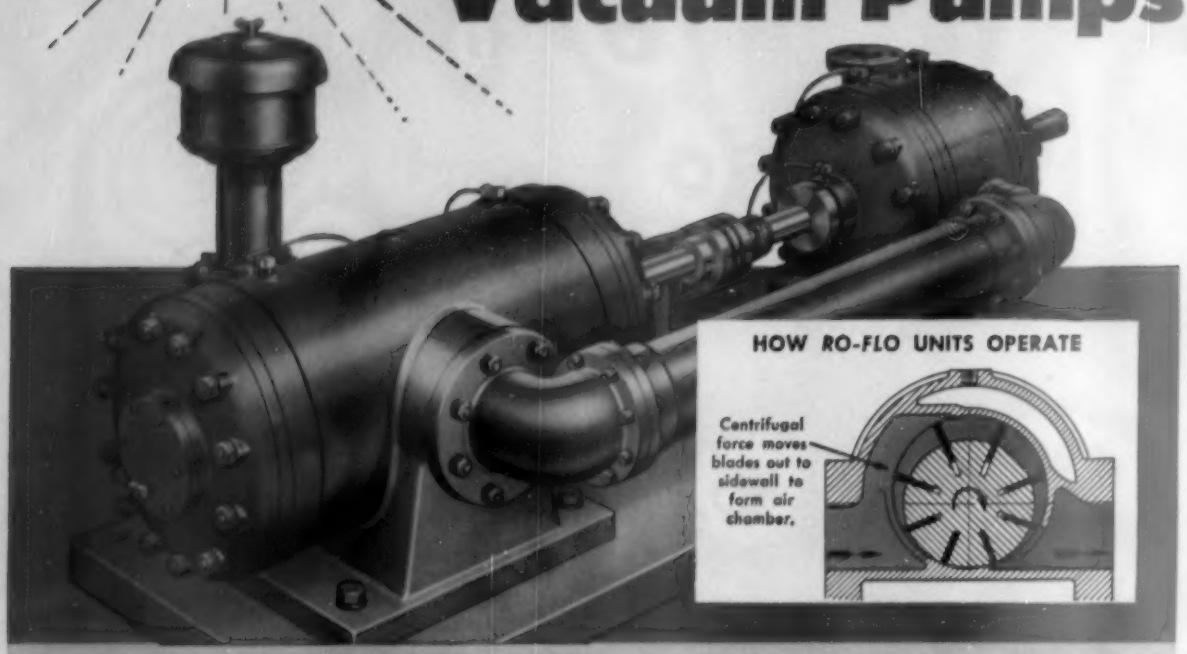
JUNE 1955

ALLIS-CHALMERS

100-lb Compressors

0.3-in. Mercury Absolute Vacuum Pumps

NEW



FOR SHOP AIR • DRILLING • GAS HANDLING • VACUUM PUMPING

Now—the *Ro-Flo* line is extended to include high pressure as well as low pressure units to give you three important advantages:

Constant efficiency — Automatic compensation for wear is inherent in *Ro-Flo* design. During operation, rotor blades slide against the sidewall to form air cells. Any blade wear from this action is compensated for by the rotating force which holds blades in contact with the cylinder.

Simple foundation requirements— The smooth rotation of the *Ro-Flo* unit cuts vibration and eliminates need for heavy, expensive foundations.

Low maintenance — Shock and vibration, inherent in reciprocating machines, is eliminated. This cuts maintenance.

Two-stage *Ro-Flo* compressors can be furnished in any of 12 sizes to handle from approximately 250 to 1800 cfm at pressures from 65 to 125 pounds gauge. Vacuum pumps furnished from 200 to 5040 cfm at 29.7 inches Hg vacuum, with shut-off of 29.9 inches Hg, referred, or better. Single-stage units are built for pressures up to 50 pounds gauge, 65 pounds absolute. Single-stage pumps for vacuums up to 28 inches Hg referred.

A-4569

GET INFORMATION

Call your nearby A-C district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Ro-Flo is an Allis-Chalmers trademark.

ALLIS-CHALMERS

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Photo courtesy Construction Aggregates Corp., Delaware, Ill.

A rubber gangplank for tomorrow's turnpike

A typical example of B. F. Goodrich improvement in rubber

THAT'S wet, sharp gravel being loaded on a ship. With millions of tons needed for new highways, gravel must be handled at low cost. A conveyor belt to shipside was the fastest and cheapest way.

But the wearing avalanche of 2800 tons an hour dumped on the belt cut and tore the rubber cover, broke the fabric reinforcement. Then engineers suggested a B. F. Goodrich *cord* belt. It is built with cords, running lengthwise, held in place by rubber. When heavy loads hit this belt it "gives"—absorbs the shock instead of fighting it. The rubber in the belt is so tough it can stand the cuts and gouges of millions of sharp edges. When this picture was taken, the B. F. Goodrich cord belt had carried more than 14 million tons, had lasted longer than any belt ever used by the company, and still looked good for years more.

Product improvement like this is *always* going on at B. F. Goodrich. New ways are constantly being found to make conveyor belts, V belts, hose, all sorts of products work better, last longer. No product is ever regarded as "finished" or standardized.

How this cuts your costs: Because of these improvements and because B. F. Goodrich is one company that will *never* lower its quality standards, you can be sure of top performance and real money savings when you specify B. F. Goodrich. To find out about the latest improvements in the rubber products your company uses, call your B. F. Goodrich distributor or write *The B. F. Goodrich Co., Dept. M-438, Akron 18, Ohio.*

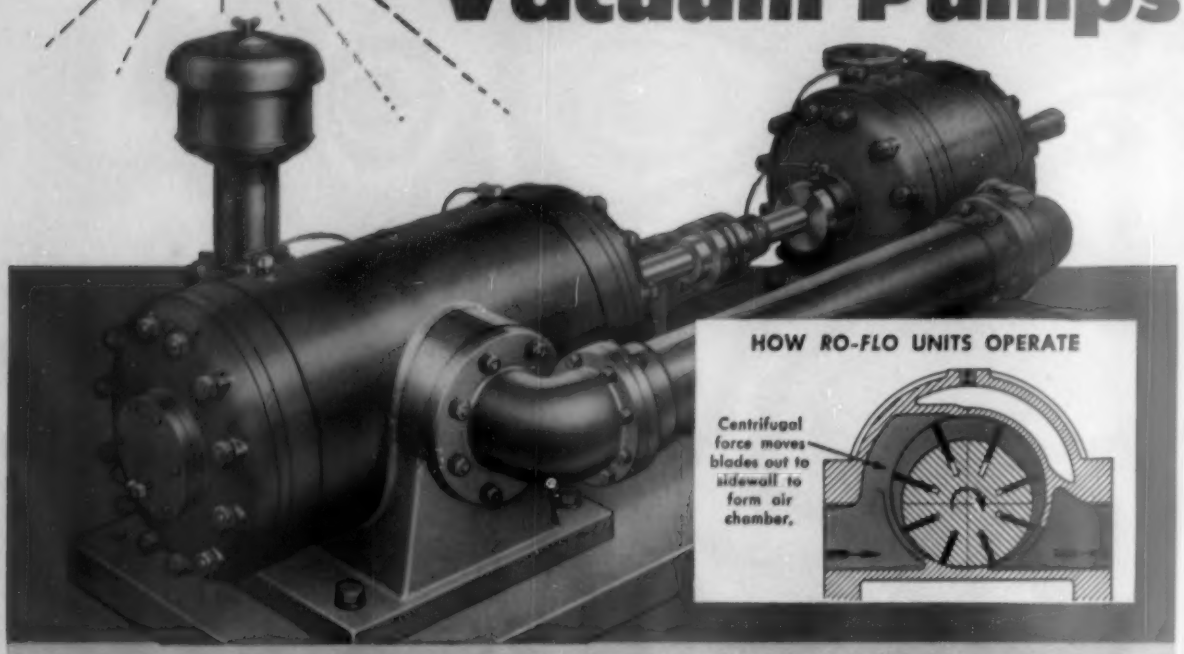
B.F.Goodrich
INDUSTRIAL PRODUCTS DIVISION

ALLIS-CHALMERS

100-lb Compressors

0.3-in. Mercury Absolute Vacuum Pumps

NEW



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A-4569

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A-C ALLIS-CHALMERS

ALLIS-CHALMERS

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Photo courtesy Construction Aggregates Corp. Chicago Ill.

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ROCK PRODUCTS

THE INDUSTRY'S RECOGNIZED AUTHORITY — LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

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We bought a $60,000 saving!

All pertinent facts *in the following story are backed by information revealed in an actual case history. We have chosen not to identify the operation because of an understandable reluctance to disclose intimate production details.*★

A YEAR AGO we put six new EASTON pan type trailers into service in one of our quarries. The EASTON equipment was chosen on a strictly competitive basis with cost-per-ton a dominant consideration.

Our purchasing study indicated a potential saving of about two cents per ton against the nearest competitor, and our records during the first year of operation show an even lower cost than we had anticipated.

At one of our other plants we have had EASTON trailers in day-to-day service for more than four years, with virtually no maintenance and still going strong. Supported by the facts now available at both operations we believe we are conservative in estimating a saving of two cents per ton over other equipment which might have been selected.

Over a period of five years the six trailers at the new plant will haul more than three million tons. That is why we say we bought a $60,000 saving when we bought EASTON.

YOU CAN'T BEAT THIS COMBINATION!

It's the famous EASTON doorless pan trailer and exclusive EASTON electric overhead dumping system. Dependable overhead dumping is *essential!* Trailer capacities, 10 to 36 tons.

★**You are invited to check the cost question with any user of EASTON equipment. Also, EASTON will always welcome an opportunity to make a competitive survey when the aim is to provide a better transportation system for mines or quarries.**

EASTON

EASTON CAR & CONSTRUCTION COMPANY • EASTON, PA.

Western Contractors Corp. cuts drilling costs on $10 Million turnpike contract with TIMKEN® multi-use bits

LOCATION: Sections 13-14, Ohio Turnpike.

OPERATING CONDITIONS: Drilling berm in shale and sandstone.

SECTIONS 13 and 14 of the Ohio Turnpike, in the vicinity of Hudson, is being worked by Western Contracting Corp., of Sioux City, Iowa. At one highway intersection there are about 1,000,000 cubic yards of rock to excavate from an open cut 80 to 90 feet deep. For drilling berm they are using two wagon drills; two more will be added later.

Since the ground is shale and sandstone, Western Contracting found Timken® *multi-use* bits the most economical. Drilling speed and bit life are high. Timken multi-use bits are usually cost-cutters in ordinary ground, when full increments of steel can be drilled—with correct and controlled reconditioning, of course!

But for hard and abrasive ground, for exceptionally deep holes, small-diameter blast holes and constant-gauge holes, Timken carbide insert bits are usually most economical. Their longer life more than compensates for their higher cost.

Both types of Timken bits, in dozens of different sizes, fit the same steel. This means that, if the ground changes, you easily and quickly switch to the type of bit that is most economical. No need to lose time hunting up different steels.

All Timken bits are made from electric furnace Timken fine alloy steel, and have the shoulder union that is designed to keep drilling impact from damaging threads.

It will be worth your while to get our recommendation on what bit to use for your present job. Write: The Timken Rock Bit Engineering Service, The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

your best bet for the best bit...for every job

Timken threaded multi-use rock bit

Timken threaded carbide insert rock bit

NOTHING is left to CHANCE

"Leave nothing to chance" is the motto of Edward Kraemer, successful Wisconsin aggregate producer. And, operating six portable plants as they do this motto is important.

These six plants are self-propelled crushing and screening units and cover 70 quarry properties out of twice that many on lease. The bidding situation and the narrow margin of profit necessitates flawless efficiency and the best in equipment.

It is significant that Edw. Kraemer & Sons have put their seventh Northwest to work.

Northwests bring a combination of advantages that make them real Rock Shovels. The Northwest Dual Independent Crowd utilizes force most independent crowd shovels waste. Uniform Pressure Swing Clutches eliminate the jerks and grabs that make spotting difficult. The "Feather-Touch" Clutch Control makes operation easy without resorting to delicate mechanisms, valves or pumps that often require special knowledge for adjustment. The Cushion Clutch eliminates shock overloads before they can reach and damage machinery! These are just a few of the reasons why so many quarries are now using Northwests. We'd like to tell you more! Why not get the *whole* story—a Northwest Man will be glad to call.

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135 South LaSalle Street, Chicago 3, Illinois

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Plain, Wis.
put their SEVENTH
NORTHWEST to work

NORTHWEST

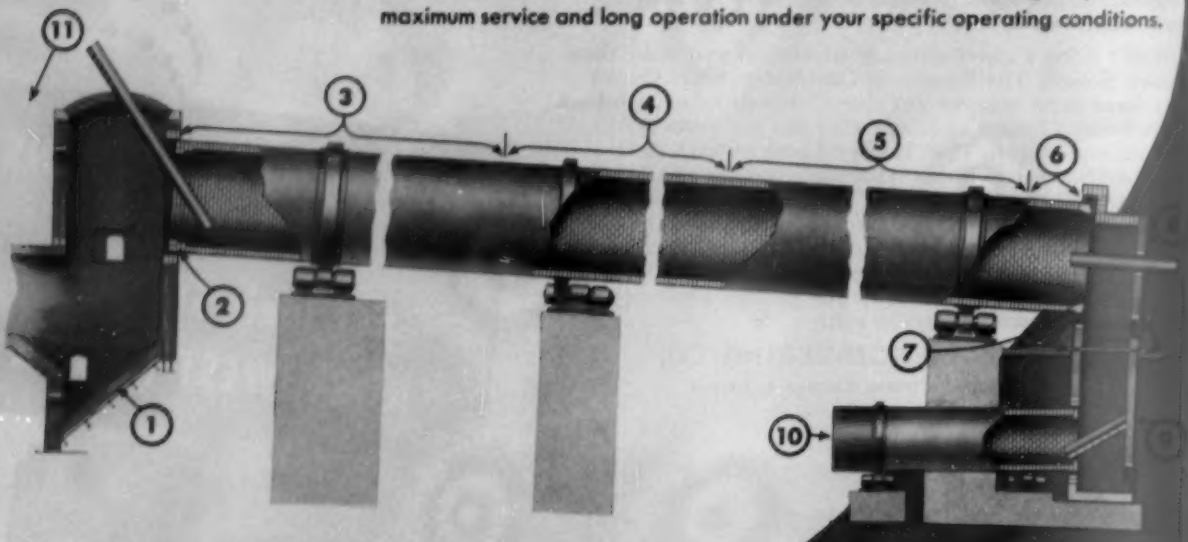
SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

Convertible for any Mining Material Handling or Excavation Problem

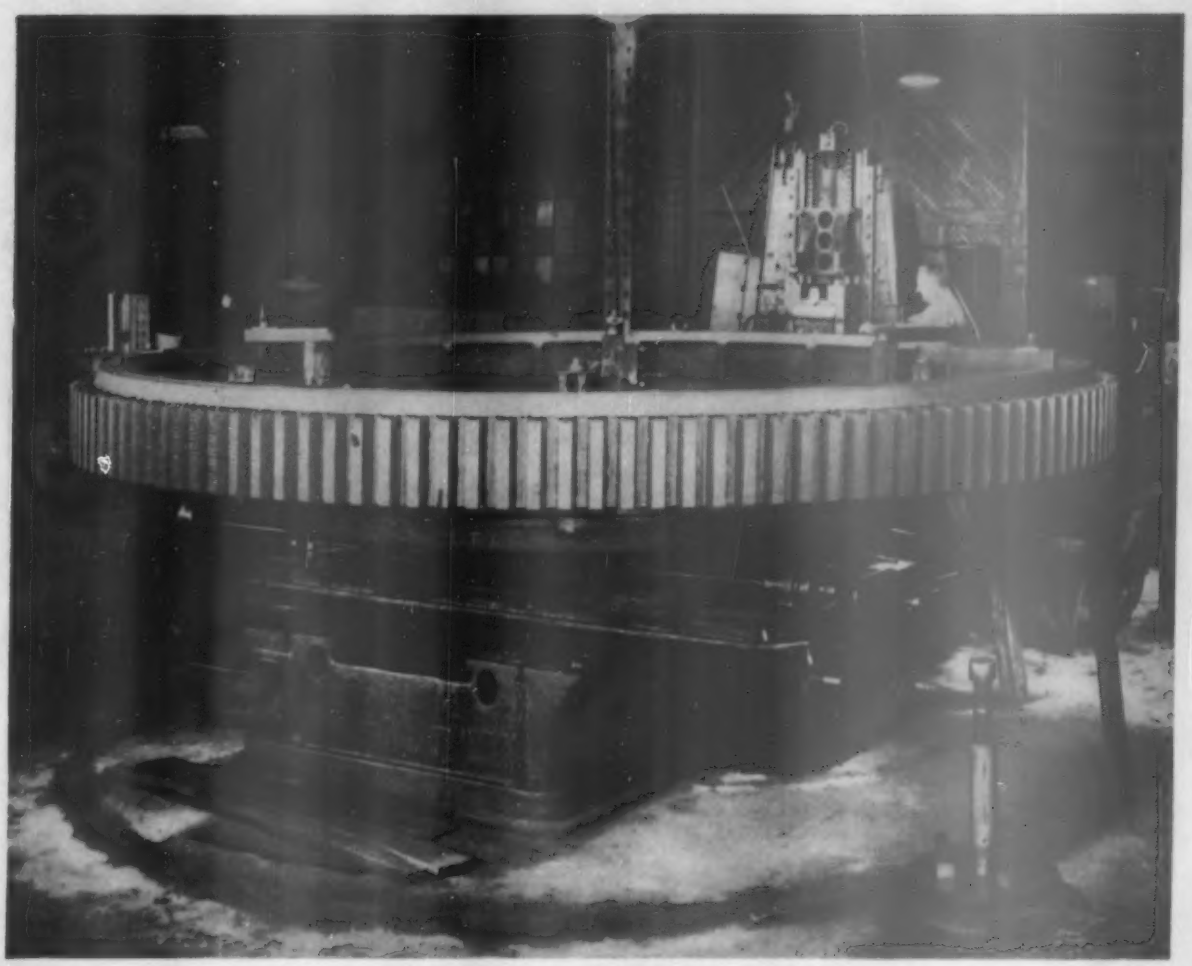
A. P. Green
REFRACTORY PRODUCTS

THESE 11 CEMENT KILN AREAS

These recommendations apply to the majority of cement and lime kilns. Where unusual conditions exist, your A. P. Green Representative will work with you to determine the most effective and economical lining to provide maximum service and long operation under your specific operating conditions.



	In This Section Of Your Kiln	These A. P. Green Brick Will Give Better Service	Approximate Temperatures
1	Dust Collectors	EMPIRE OR OZARK Dry Press brick for moderate duty service.	Up to 1300° F. or 705° C.
2	Feed End or Tail Ring Construction	MEX-KO or EMPIRE for mechanical strength, structural stability and uniformity.	Up to 1400° F. or 760° C.
3	Drying or Preheating Zone	EMPIRE Liners for high strength, uniformity, resistance to abrasion.	Up to 1800° F. or 980° C.
4	Intermediate Zone	A. P. Green HOT ZONE Liners to resist spalling and abrasion.	Up to 2400° F. or 1315° C.
5	Burning Zone	KRUZITE Liners to resist chemical attack, slagging, spalling and abrasion.	Up to 2900° F. or 1595° C.
6	Cooling or Soaking Zone	A. P. Green HOT ZONE Liners to resist abrasion and spalling.	Up to 2500° F. or 1370° C.
7	Discharge or Nose Ring Block	MEX-KO or EMPIRE for mechanical strength, dimensional uniformity and resistance to thermal spalling.	150° F. to 2200° F. or 65° to 1205° C.
8	Kiln Hood	MEX-KO, EMPIRE or castable construction to resist spalling.	Up to 2400° F. or 1315° C.
9	Clinker Chute	EMPIRE to resist abrasion and spalling.	Up to 2200° F. or 1205° C.
10	Cooler	EMPIRE Liners for rotary coolers to resist abrasion and spalling.	Up to 2000° F. or 1095° C.
11	Waste Heat Boiler (not shown above)	EMPIRE or OZARK Dry Press brick for moderate duty service.	Up to 1200° F. or 650° C.



Traylor machines are "geared" for profits

Precision cut steel gears are one of the big reasons why operators of Traylor mills find them economical to operate . . . less costly to maintain. Traylor drive gears have for many years been cut with high and low addendum on a Maag Gear Generator. This precision type machine tool will handle any size gear up to 22' - 0" in diameter. It can cut teeth up to 22" face. That's why any size grinding mill or rotary kiln can be geared for profits by having it "Traylor-made."

SEND FOR BULLETINS . . . just mention the Traylor Equipment that interests you.

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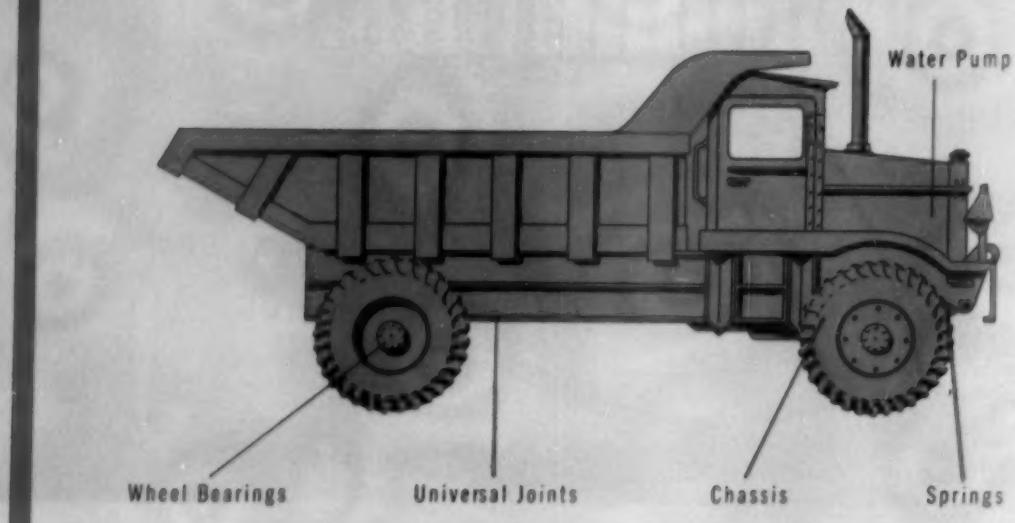
Canadian Mfrs.: Canadian Vickers, Ltd., Montreal, P. Q.

A Traylor leads to greater profits

SALES OFFICES · NEW YORK · CHICAGO · SAN FRANCISCO

This **one** *grease* *does*



all *these lubrication jobs*

Here's a lithium-base, multi-purpose grease that combines in a single product the best qualities of many greases plus exclusive properties of its own.

Gulflex A provides excellent protection for wheel bearings, springs, chassis, universal joints, water pumps, or any grease lubricated bearings. It replaces five or six different greases you may now be using, and does a better job.

Here are some of its outstanding features:

- Resists the washing action of water.
- Won't harden at low temperatures.
- Performs perfectly at high temperatures.
- Will not lose consistency under extreme service.
- Easy to apply—good pumpability.

And here's what it does for you:

- Saves time on lubricating jobs.
- Saves on inventory—saves on equipment.
- Saves on space—reduces waste.
- Reduces lubrication costs.

Make your next order for grease an order for savings in time and money with the one grease needed for more effective lubrication over longer periods—Gulflex A. Contact your nearest Gulf Sales Office today and have a Gulf Sales Engineer show you how Gulflex A can be put to work—profitably—in your operation. Gulf Oil Corporation · Gulf Refining Company, 1822 Gulf Building, Pittsburgh 30, Pa.

GULFLEX A

the outstanding **lithium-base,** multi-purpose grease

GULF

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Don't miss this opportunity! . . . Send for samples . . . Preferably, call in the Raymond man. . . . Not the slightest obligation!

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Middletown, Ohio
Phone 2-5461

Raymond

MULTIWALL PAPER SHIPPING SACKS

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Announcing the NEW EXCALODER

For low-clearance underground work—or general bulk materials handling

DESIGNED for use with the high-speed, heavy-duty Link-Belt Speeder LS-98, the *Excaloder* is a telescoping, interchangeable, front-end attachment for high-production loading. Job-tested for a year and a half, it has proved today's most advanced method for loading shot rock, sand, gravel or other loose materials into trucks or other haulers.

Here are some of the *Excaloder's* outstanding advantages . . .

EXCEPTIONALLY LOW OVERHEAD CLEARANCE—Standard mast requires only 15 ft., 10 in. clearance height . . . maximum dumping height with stick extended at 45°, is 16 ft., 11 in. Extra-low mast, optional, permits minimum clearance height of only 11 ft., 3 in.

FAST, POSITIVE, PRECISE CONTROL—*Excaloder* brings you the benefits of Speed-o-Matic—the true power hydraulic control system. These fingertip controls provide perfect "feel" for speed with accuracy . . . permit infinite positioning of the bucket at variable angles to the stick . . . reduce operator fatigue . . . boost output by up to 25% or more.

FULL-TIME HYDRAULIC BUCKET CONTROL—Through Speed-o-Matic, the *Excaloder* operator can control the speed of dumping. He can also either dump or return the bucket, regardless of the position of the attachment.

POWERFUL, INDEPENDENT CHAIN CROWD AND RETRACT—This chain crowd arrangement provides more positive crowding and retracting than is found in other types of crowd mechanisms. It also stands up longer, minimizes downtime.

STRAIGHT-LINE BUCKET MOTION—This motion, during crowding or retracting, makes the *Excaloder* particularly valuable for grading and clean-up or loading from stock piles. For many cleaning and similar operations, the bucket can be tilted to the dump position and used for dozing. 13.522

INDEPENDENT SWING AND TRAVEL—This optional feature allows the *Excaloder* to work while it travels.

NEW EXCALODER CATALOG gives you more complete data and specifications. For your copy, contact your Link-Belt Speeder distributor or write—LINK-BELT SPEEDER CORPORATION, Cedar Rapids, Iowa.

LINK-BELT SPEEDER

LOAD..MOVE..and FILL at LOWER COST

with Firestone NYLON TIRES

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*T.M. Reg. U.S. Pat. Off.

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Why do some crushers earn more profit than others?

There can be several answers to the above question . . . but the most successful producers are generally those who *keep maintenance costs down.*

That, in a nutshell, is why more and more crusher men are switching to ORO Manganese replacement parts. They've found that when crushing surfaces are made from this remarkable metal, they give up to 25% longer service.

There are three reasons.

First, by use of several alloy additions, Kensington engineers have succeeded in developing a number of remarkable wear-resistant alloyed manganese steels. These metals actually *fight back* when exposed to wear.

Parts made from ORO KENKROME, for example, have unusual initial hardness, but develop an even greater *surface hardness* when exposed to impact. But while their surface becomes harder and harder, the metal underneath always remains tough . . . better able to stand the shocks and stresses which shatter less durable metals.

Second, Kensington's own scientific process of heat treating gives these metals a structure superior to that of ordinary manganese steels . . . and makes them even better equipped to resist wear.

Third, in most instances the original design has been improved. Kensington's Quad-edge, renewable hammer tips offer a good example. This exclusive design provides *four* service edges. In most cases, half the metal can be worn away before replacement is necessary. Hammer shanks may be used over and over again.

The following replacement parts are available in ORO Manganese:

- *Jaw and cheek plates (for jaw crushers)*
- *Roll shells, smooth and corrugated (for roll crushers)*
- *Mantles, bowl liners (for cone crushers)*
- *Mantles, concaves (for gyratory crushers)*
- *Hammers, grates, liners (for pulverizers)*
- *Shell and end liners, screens (ball, rod, tube mills)*
- *Cages (impellers) and liners (for disintegrators)*

Despite their longer life, *these cost no more than ordinary parts.*

It will take only one trial to prove to you that ORO Manganese is all we claim. There's a great possibility that the coupon below may save you hundreds of dollars.

Mail it today.

Wear Resisting ORO Manganese Replacement Parts

Long-wearing mantles and bowl liners for cone crushers.
Roll shells for all standard roll crushers.
Concaves (regular, non-choking, or reduction type) for gyratory crushers.
Quad-Edge renewable-tip and conventional one-piece hammers for hammer mills.

Kensington STEEL COMPANY

KENSINGTON STEEL CO., Dept. R, 505 Kensington Ave., Chicago 28, Ill.

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Type of Crusher_____ Make_____

Size_____ Casting Part Number_____

NAME_____

COMPANY_____

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100,000 MILE WARRANTY

At last—you can buy truck engine performance *by the mile*. This 100,000 mile warranty backs up the full line of revolutionary Reo Gold Comet Engines. Every Six from 107 to 160 horsepower. Every V-8, from 195 to 220 horsepower; pound for pound, these are the *most powerful truck engines ever built*. All short stroke! All wet sleeve cylinder construction! All high velocity cooled! Your choice of gas or LP-Gas. By every comparison Reo has the most completely modern truck engines on the road. So now, *it's a provable fact*. The day is here when buying less than a Reo truck for medium or heavy duty hauling *can cost you money*. Get all the facts from a Reo man today.

REO

SUBSIDIARY OF BOHN ALUMINUM AND BRASS CORPORATION

WATCH REO ROLL

Reo Motors, Inc.
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FOR BIG PRODUCTION in sand and gravel

MARION

This Indiana plant needs big production to keep pace with its demand for cement, hot mix, sand and gravel.

The MARION 111-M, can handle a 4 cu. yd. bucket on 100′ boom. Easily and dependably, it keeps the raw materials flowing into the busy plant. It handles the stripping assignments, too. The long boom and easy maneuverability of the MARION hold movements of the carloading hopper to a minimum. Why not learn today what the MARION 111-M can do for you in sand and gravel or stone loading?

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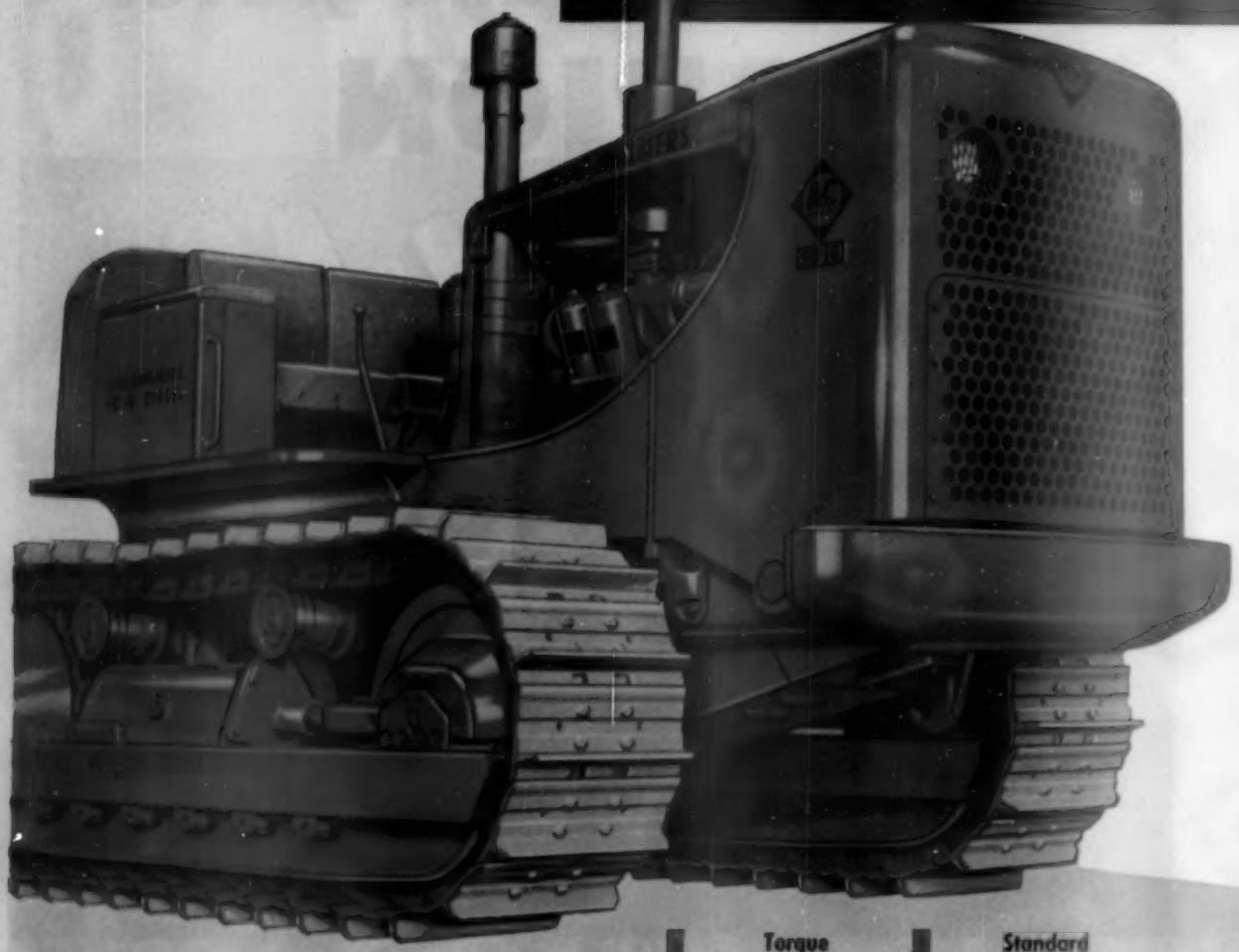
from 1 to 60 cu. yds.

OSGOOD-GENERAL, a subsidiary, manufactures excavating machines from ½ to 2½ cu. yds., truck cranes from 15 to 25 tons, Mobilcranes from 25 to 45 tons, and log loaders.

Allis-Chalmers presents the NEW HD-16



Your choice of two outstanding drives

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Horsepower	150 net engine hp	131 belt hp
Weight	31,600 lb	31,500 lb
Drawbar pull	up to 60,000 lb *	up to 35,945 lb *

*Limited, under normal tractive conditions, to 90 percent of total weight of tractor and mounted equipment.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

NEW STANDARDS OF PERFORMANCE

for a wide range of heavy-duty work

Set your sights on an HD-16! This big new tractor not only brings you *more* power for bigger jobs . . . it makes more effective use of horsepower, with a brand new Allis-Chalmers diesel engine and your choice of two new drives — the job-proved torque converter or the easy-shift standard transmission. Either way, the HD-16 brings you a new high in tractor-operator efficiency . . . a new high in work done under even the toughest conditions.

NEW STANDARDS OF DEPENDABILITY AND LONG LIFE

under *all* conditions!

The HD-16 follows the Allis-Chalmers *advanced basic design*, with such important features as its all-steel, Box-A main frame and one-piece steering clutch and final drive case . . . straddle-mounted final-drive gears with tapered roller bearings . . . unit construction . . . simplified lubrication and service designed with *better* maintenance in mind. What's more, it is newly engineered throughout to provide big safety factors in all components . . . plus outstanding new features like the new Allis-Chalmers heavy-duty diesel engine, new "wrap-around" radiator guard, husky new transmissions, new true-dimension track, and many others.

All in all, the new Allis-Chalmers HD-16 brings you an outstanding combination of performance and long life with both mounted and drawn equipment . . . a higher rate of production, more working time, more work done, LOWERED JOB COSTS. You OWE it to yourself to get all the facts now from your nearby Allis-Chalmers dealer.

Check Up On Grinding Ball Performance . . . Do You Have The Best Ball In Play?

Ask the "Ump" why he doesn't allow a scuffed, out-of-round baseball or one with soft spots to stay in play. He'll tell you it handicaps the batter and is a detriment to the game.

In leading mills around the world there are plenty of buyers who will tell you that Sheffield Moly-Cop Balls grind out the lowest cost-per-ton-unit ground. Why? Because of the exceptionally fine balance of toughness and deep hardness, Moly-Cop Grinding Balls keep their shape longer—grind out savings by reason of longer, uniform wear.

A Sheffield man stands ready to demonstrate this in your mills under your own particular grinding conditions.

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Grinding Balls

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performance of new SIMPLICITY GRIZZLY-FEEDER draws highest praise from user . . . E. W. Hallett

View showing discharge end of the Simplicity 3' x 10' Grizzly-Feeder.

A year ago Mr. E. W. Hallett, President of the Hallett Construction Company of Crosby, Minnesota ordered a Simplicity Oscillating Feeder with a grizzly deck. In a letter we received from him recently, he says: "That feeder works perfectly, and we have never had one pebble hang up on the grizzly part of it. We are very much pleased with it. I believe that it would feed 700 tons an hour if we were to call on it to do it." This is high praise indeed, but it is praise well directed, for the Simplicity Grizzly-Feeder is a new and important contribution to the mining and quarrying industry.

Cuts costs 50%

This unit combines scalping and feeding in one operation, thus completely eliminating the old type apron conveyor and stationary grizzly. The savings are readily apparent . . . you gain additional plant room and save 50% in operation and maintenance costs. The unit is available in sizes from 2' x 8' to 6' x 12', and in capacities up to 1000 tons per hour. A request to us at Durand or to any of our many sales representatives will bring you full information about the Grizzly-Feeder.

SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A.

FOR CANADA: Simplicity Materials Handling Limited, Guelph, Ontario.

FOR EXPORT: Brown and Sites, 50 Church Street, New York 7, N. Y.

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ENGINEERING COMPANY • DURAND 13, MICHIGAN

How AMSCO® helps you HARDFACE MORE EFFECTIVELY

The complete line of 15 Amsco hardfacing rods represents a selection of the toughest, hardest alloys available. Among the metals used for alloying are these highly wear-resistant elements—manganese . . . chromium . . . nickel . . . cobalt . . . tungsten . . . molybdenum. Each has particular resistance to certain types of wear—including impact, abrasion, heat, corrosion.

Your Amsco distributor has many helpful methods for selecting the proper hardfacing rod to most effectively combat types of wear you contact daily. *Make him your hardfacing headquarters.*

AMSCO CATALOG MAKES ROD SELECTION EASY

Write for the free catalog, *Amsco Hardfacing Alloys.* It presents complete analyses, metallurgical information and other pertinent data about Amsco's complete line . . . making it easy for you to look up the right rod to use in hundreds of common hardfacing applications. It is easy to understand and to apply the suggestions to your own operations. Send for it today.

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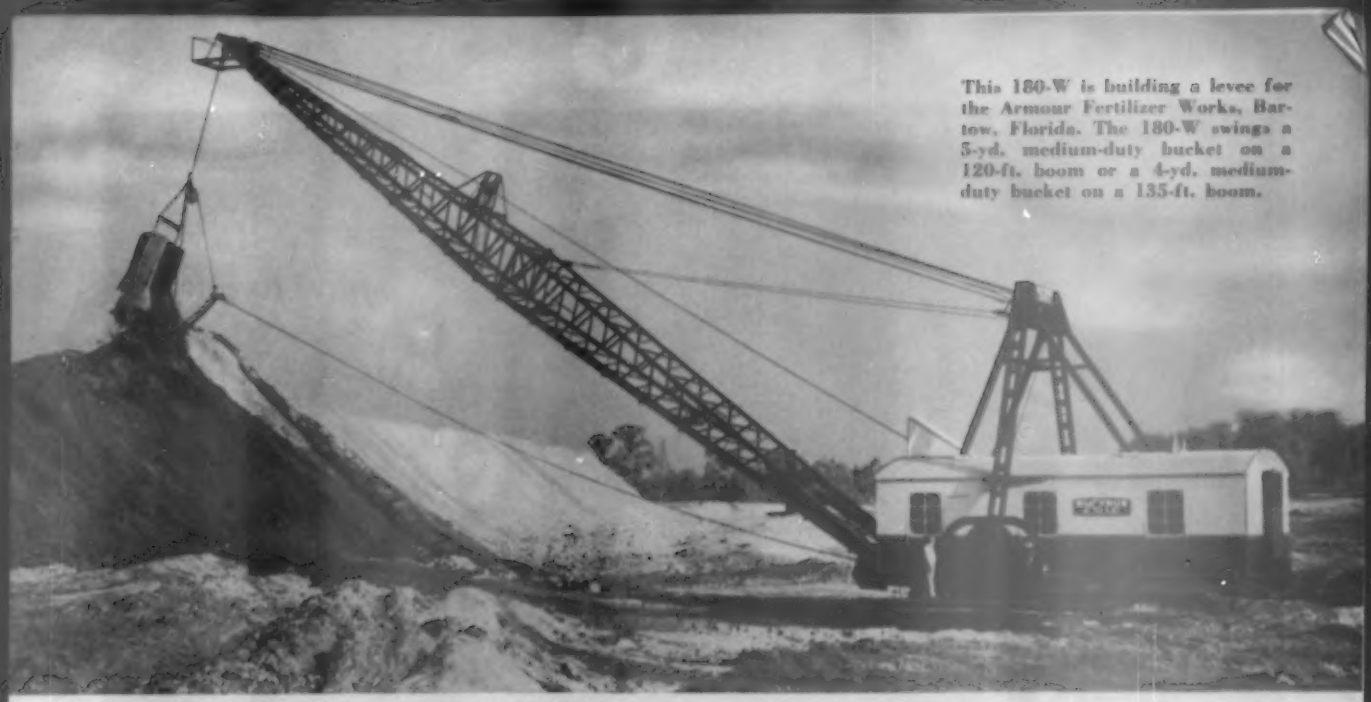


This 180-W is building a levee for the Armour Fertilizer Works, Bartow, Florida. The 180-W swings a 5-yd. medium-duty bucket on a 120-ft. boom or a 4-yd. medium-duty bucket on a 135-ft. boom.

BIG CAPACITY Digging Ability... Readily Moved From Job to Job

BUCYRUS-ERIE 180-W WALKING DRAGLINE

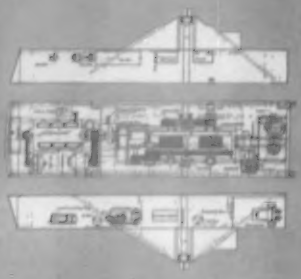
Mining and quarrying jobs need the economical, high-capacity dirt moving offered by Bucyrus-Erie walking draglines. The new 180-W has it plus unmatched ease in moving from job to job.

The 180-W is readily dismantled — only partial disassembly is necessary for moves. No main machinery components are disturbed; misalignment problems are eliminated. Ease of moving saves time and expense and greatly increases the 180-W's value throughout its life.

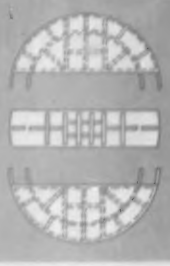
Along with its unusual portability, the 180-W brings to more jobs the dependable, big-output performance; quick maneuverability; long working range; and low maintenance costs that are traditional in every Bucyrus-Erie walking dragline. Send for complete information.

2BLS5C

FIVE U.S. RAILROAD CARS CARRY ENTIRE MACHINE



Side wings unbolt from center section of revolving frame. Main machinery remains fully assembled, stays in proper alignment.



Base is in three separate welded steel sections, joined by bolting flanges—easily disassembled and shipped.

The operator's cab and center section of the revolving frame, loaded on a flat car for shipment, are shown here.

BUCYRUS ERIE
South Milwaukee Wisconsin

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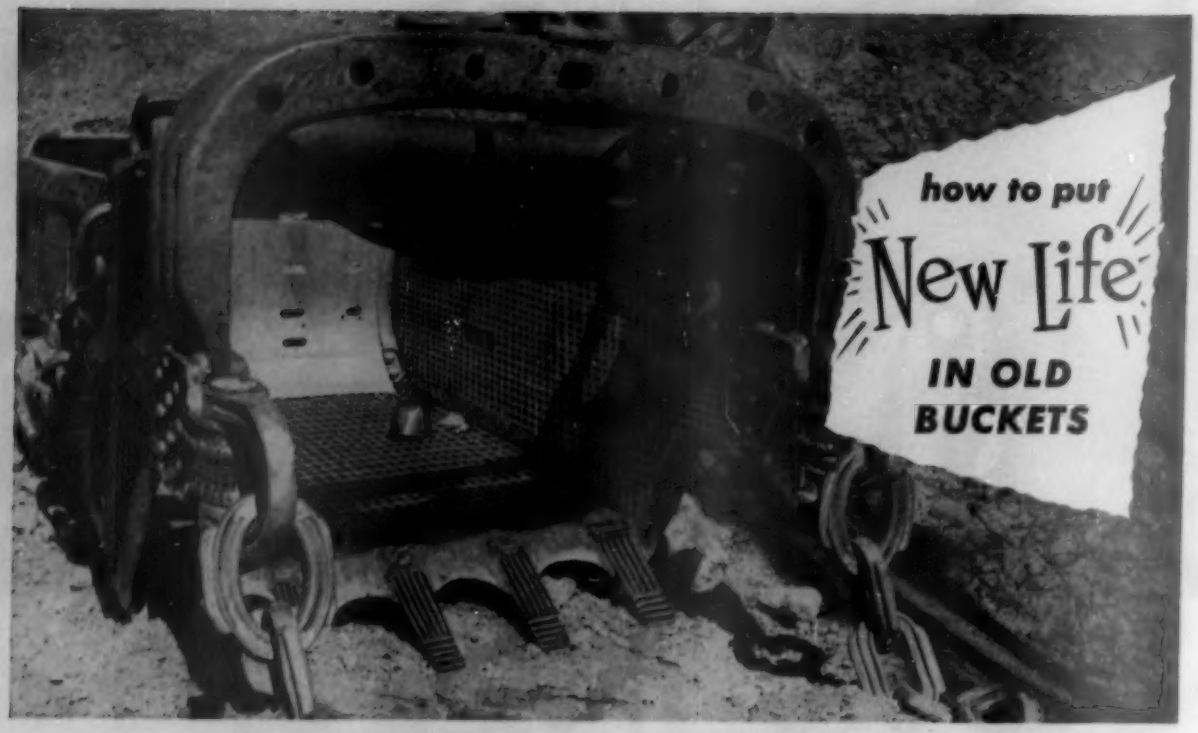
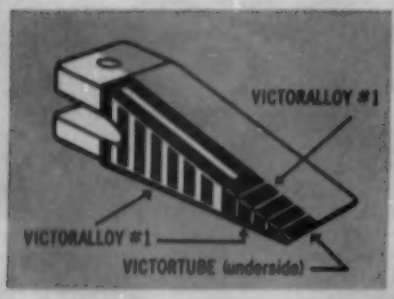
YEARS OF SERVICE to Men Who Shape the Earth



USE VICTOR HARDFACING



Buckets . . . Apply VICTORALLOY #1 to top and bottom of bucket lips in overlapping beads. Protect other parts or areas showing wear with stringer beads of VICTORALLOY #1. Use 3/16" coated VICTORALLOY #1 at 170 to 190 amperes, a.c. or d.c., or ¼" at 200 to 225 amperes. If wear is unusually severe, substitute VICTORITE on bucket lips; use 3/16" coated at 120 to 150 amperes, a.c. or reverse-polarity d.c.

Teeth . . . Apply VICTORTUBE to underside from point upward about 2", and VICTORALLOY #1 to upper side of tooth same distance. Use stringer beads of VICTORALLOY #1 on balance of upper and lower surfaces, and on edges. Use 3/16" coated VICTORTUBE at 130 to 160 amperes, a.c. or reverse-polarity d.c., and 3/16" coated VICTORALLOY at 170 to 190 amperes, a.c. or d.c.

Why guess? . . . Select the right alloy from VICTOR's complete hardfacing line, made for both gas and manual or automatic arc application. New VICTOR illustrated hardfacing manual tells which alloys to use, how to apply. Ask your VICTOR dealer or write us today for your free copy.

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What's Happening

IN OTHER FIELDS OF INTEREST TO THE ROCK PRODUCTS INDUSTRY

June, 1955

A "ghost" industrial sand plant, built 14 years ago to avert what was expected to be a production shortage during World War II, still stands at Mt. Eagle, Penn. The emergency waned before completion, and the plant was abandoned. It was originally a frame structure, but was rebuilt of concrete block in 1941 when it was sold to a Johnson, Penn., firm by Warren Carson, the former owner. It was designed so that stone from a nearby quarry could be trucked to an upper floor where the stone would travel by gravity through crushers and screens. The finished product was to be stored in a large capacity concrete bin, which would unload to trucks.

Owners of land in Minnesota containing material needed for cement production will be required to develop the material commercially or sell the property to someone who will develop it, as a result of a bill passed by the State house of representatives. The legislation was aimed at marl and limestone deposits owned by a cement company near Monticello, Minn. It has been charged by proponents of the bill that the company refused to develop the deposits, thus adding to a shortage of cement in the state. According to the bill, the state department of business development can condemn the land and sell it to a company for development if the owner has no plans for development in the near future.

Concrete highways and bridges may soon be treated with water-repellent silicone chemicals, a formula known as "SC-50," developed by General Electric Co. Freezing and thawing tests conducted by the company showed that concrete tested with the water-soluble silicones resisted deterioration "twice as long" as untreated samples. The silicones act to seal the pavement, preventing water from penetrating into the concrete, but are said not to make the surface slippery during or after rainfall. It is also claimed to keep the concrete surface from becoming rough and exposing the aggregate content.

Industrial construction contract awards, in the 37 states east of the Rockies, totaled $176 million in March, 1955, an increase of almost 120 percent over March, 1954, according to an F. W. Dodge report. Current high levels of construction show an expansion of industrial and other non-residential building, comparable with the more widely publicized increase in housing. During the first quarter of 1955, industrial contract awards were about 26 percent above the same period of 1954, being the first substantial upturn in the industrial category since it dropped from a peak in 1951.

A test highway is being built in Illinois by the state of Illinois and the federal government to determine the best materials and design for carrying heavy semi-trailer trucks. The test will be conducted by the Highway Research Board. Cost of special testing loops and operation, which is expected to total $12,000,000, will be shared by the 48 states, including the District of Columbia, Puerto Rico and Hawaii.

WHAT'S HAPPENING

Underground tests for uranium are being conducted at Camp Smith, near Peekskill, N. Y., by the Atomic Energy Commission, according to a report in **Chemical and Engineering News.** Tests of surface stone at the 2100-acre National Guard reservation show it to contain approximately twice the amount of uranium as in some profitable mines in Colorado. Drilling operations at the site are expected to cost $11,000, 75 percent of which is being paid by the Federal Loan Defense Minerals Exploration Administration.

The growth of the trucking industry in the United States, almost three times the rate of growth of passenger cars, is expected to triple in size by 1975, according to P. J. Monaghan, vice-president of General Motors Corp. Mr. Monaghan believes past forecasts of the industry have been underestimated, and predicts that 20 years from now the number of trucks registered will reach 30,000,000.

The steel industry in the United States is reported to have the capacity to produce a record 125,828,310 net tons steel in 1955, which is approximately 34 million tons or 37 percent more steel than could have been produced nine years ago at the end of World War II. It also exceeds the previous high capacity of 1954 by almost 1.5 million tons.

Snow-removal equipment, ashes and manpower were furnished by Marquette Cement Manufacturing Co. and Lehigh Portland Cement Co., during a snowstorm at Oglesby, Ill., last winter. City Commissioner Frank Rigazio commented: "Our community can be proud of the cooperation we have always received from industries in Oglesby."

A plumbing fixtures and metal products manufacturer, Crane Co., Chicago, Ill., has started a diversification program, and has begun dredging operations near Aiken, S. C. Ilmenite, rutile, zircon and monazite mining is being conducted there by Marine Minerals, Inc., a Crane Co. subsidiary.

A fire which destroyed a concrete block plant at Elkhart, Ind., causing $100,000 damage, was started by an arsonist who admitted placing a construction warning flare next to the frame building. He was quoted as saying that he was mad at the world because of a series of reverses he had suffered and that he vented his wrath on the building.

Record construction of $56 billion has been predicted for 1955 by the Associated General Contractors of America. The figure would compare with the present record of $52 billion, set in 1954, which included $37.2 billion in new construction and about $15 billion in maintenance and repair, according to the association. The outlook for 1955 anticipates about $40 billion for new construction, with maintenance and repair work at about $16 billion.

Heavy construction awards, nationally, totaled $5,816,072,000 for the first 17 weeks of 1955, or 49 percent higher than in 1954, and 13 percent above 1953's all-time high, as reported in Engineering News Record.

THE EDITORS

a complete engineering service for the ROCK AND CEMENT INDUSTRY!

Sound judgment and recognized engineering ability are important factors of the complete engineering service which Giffels & Vallet, Inc. provides to the Rock and Cement Industry. Equally important is the experience engineered into each Giffels & Vallet, Inc. project . . . experience gained through more than thirty years of professional service.

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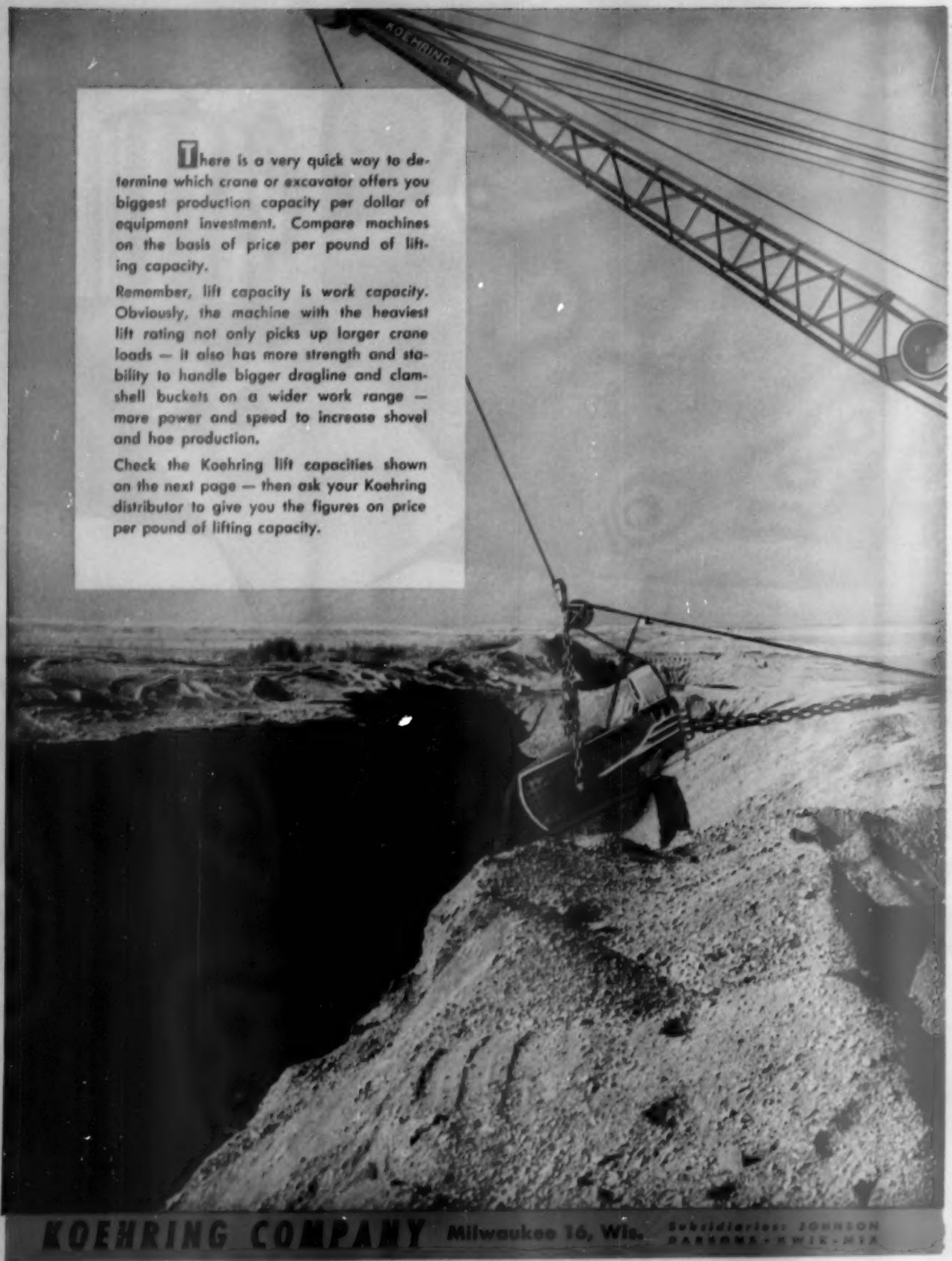
There is a very quick way to determine which crane or excavator offers you biggest production capacity per dollar of equipment investment. Compare machines on the basis of price per pound of lifting capacity.
Remember, lift capacity is work capacity. Obviously, the machine with the heaviest lift rating not only picks up larger crane loads — it also has more strength and stability to handle bigger dragline and clamshell buckets on a wider work range — more power and speed to increase shovel and hoe production.
Check the Koehring lift capacities shown on the next page — then ask your Koehring distributor to give you the figures on price per pound of lifting capacity.
KOEHRING COMPANY Milwaukee 16, Wis.
Subsidiaries: JOHNSON BARROWS • KWIK-MIX

Check price per pound of lifting capacity

KOEHRING MODEL	SIZE DIPPER	KOEHRING LIFT CAPACITIES (Crawler ratings based on 75% of tipping load. Rubber-tired machines — 85% of tipping load)		PRICE PER POUND OF LIFT CAPACITY*
205 CRAWLER	½-Yd.	20,000 lbs.	30-foot boom at 10-ft. radius	?
205 ON RUBBER	½-Yd.	30,000 lbs.	25-foot boom at 12-ft. radius	?
304 CRAWLER	¾-Yd.	27,800 lbs.	35-foot boom at 12-ft. radius	?
304 ON RUBBER	¾-Yd.	30,000 lbs.	30-foot boom at 10-ft. radius	?
405 CRAWLER	1-Yd.	40,000 lbs.	40-foot boom at 12-ft. radius	?
605 CRAWLER	1½-Yds.	72,300 lbs.	50-foot boom at 12-ft. radius	?
1005 CRAWLER	2½-Yds.	199,000 lbs.	80-foot boom at 12-ft. radius	?

Figures available on request—ask your Koehring distributor for them.

National Slag Limited standardizes on Deister Screens in a new million-dollar plant

Lightweight plant at National Slag Ltd., showing (left to right) the crusher building and the finish screening building. Radial stackers lead to the fine and coarse slag stockpiles. Lightweight plant is equipped with Deister Type UHS 4 x 12 double-deck Vibrating Screen for scalping; two 4 x 12 double-deck UHS Screens for secondary; two 5 x 12 single-deck UHS Screens for final screening.

One of the most modern plants in the aggregates industry is operating along Queens Highway No. 20A, in eastern Hamilton, Ont., Canada. Owned by National Slag Ltd., the million-dollar dual-plant operation has a capacity of 90 t.p.h. of lightweight slag aggregates, and 150 t.p.h. of air-cooled or hard slag aggregates.

Vibrating screens, of course, play a critical role here in meeting National Slag's requirements for high-speed, low-cost sizing to rigid specifications. That's why, after careful study, they installed Deister Heavy-Duty Type UHS Vibrating Screens *all the way . . .* from scalping to finishing.

In selecting vibrating screens, National Slag Ltd.'s primary requirements were high capacity and peak efficiency in sizing. *The Deister Type UHS provides it through its exclusive opposed elliptical throw principle.* They wanted long, trouble-free operating life with minimum maintenance and downtime. *The Deister Type UHS features a life-time unitized vibrating mechanism, with two-bearing construction and oil-bath operation. And it features divided interchangeable screening sections, quickly changed or shifted to distribute normal wear and prolong life of screening medium.*

National Slag Ltd., like leading aggregates producers throughout the U. S. and Canada, know they can always depend on the Deister Machine Company for *advanced features...and personal interest by top management in the continued successful operation of every installation of Deister Vibrating Screens.*

Coarse (⅛" to ⅞") and fine (minus ⅞") expanded slag is sized at lightweight plant by this pair of Deister Type UHS single-deck 5 x12 Vibrating Screens.

Write today for complete information.

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DEISTER MACHINE COMPANY

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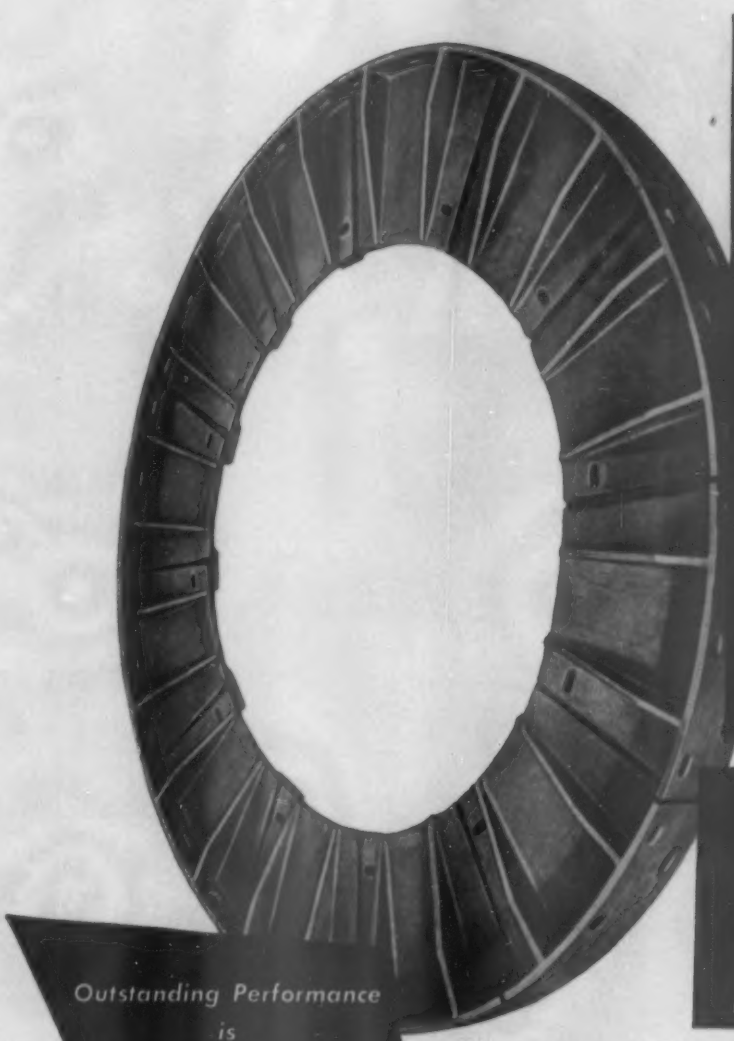

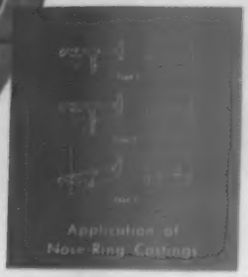

Outstanding Performance
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with B&W Nose-Ring Castings and Tail-Ring Castings

In cement kilns throughout the industry, long-lived B&W alloy Nose-Ring and Tail-Ring Castings have established a firm reputation for outstanding performance and economy by reducing operating costs and contributing to sustained high production.

B&W Alloy Nose-Ring Castings are establishing a record of fast-growing acceptance by cement plants in all sections. Recent installations have increased the total to more than 200 sets (over 7,000 pieces)—now in operation on the discharge end of rotary kilns in leading cement, lime, and dolomite plants.

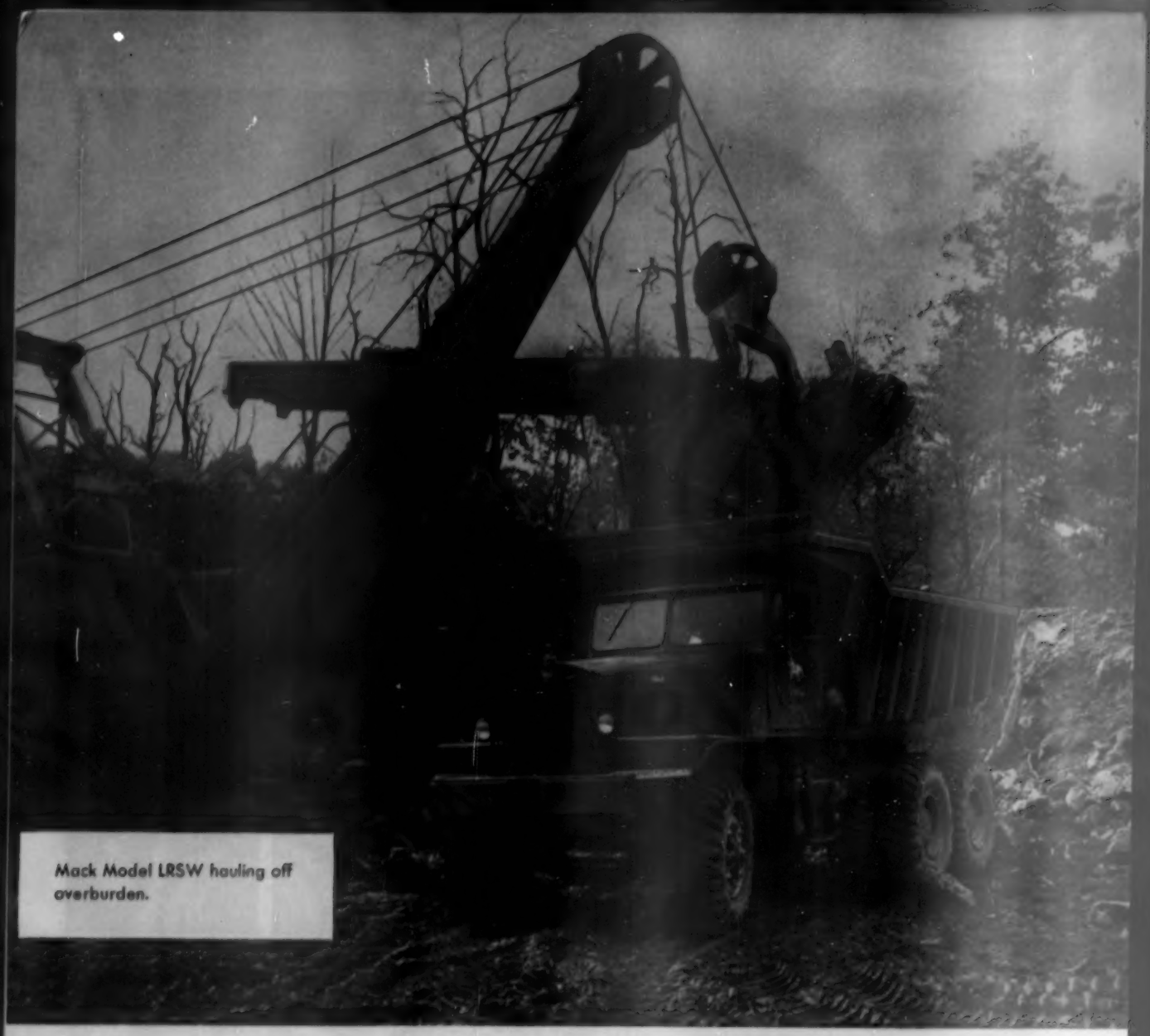
B&W Nose-Ring Castings are characterized by longer brick life and continuous operation by elimination of kiln shell "belling"; overcoming of "feathering-down" of end of kiln shell due to oxidation, since shell is protected from direct flame; low installation cost, due to small size and light weight of B&W Castings; protective flange on casting which permits use of low-alloy steel bolts, and reduction of spare part inventory because the same casting will fit kilns varying up to two feet in diameter.

B&W Tail-Ring Castings withstand temperatures exceeding 1800 F at the feed end of the kiln; standard kiln lining only is needed. These castings provide a kiln opening of proper size, and are designed with overlapping segments, which prevent loss of feed material and allow ample expansion to minimize the possibility of belling out of the kiln shell.

For detailed information in relation to your requirements write: The Babcock & Wilcox Company, Process Equipment Dept., Barberton, Ohio.

BABCOCK & WILCOX

B-437



Mack Model LRSW hauling off overburden.

big shovels call for big trucks

Today's big-yardage jobs demand maximum loads per haul and faster time cycles from shovel to dumping point and return. Increasing use of larger and larger shovels points to the Mack Models LRSW and LRVSW six-wheel dump trucks as the answer to these stepped-up requirements.

Here are trucks that are built to keep big shovels on the go...to give mine operators increased production per driver and per truck dollar invested.

These Macks will move 21 to 28 yards with unfaltering ease over the toughest terrain. No miring in with these Macks—they have the advantage of Mack's famous Balanced Bogie with exclusive Power-Divider, enabling them to pull through where other trucks bog down. In actual service these models have demonstrated their ability to maintain the time schedule of smaller-capacity dumpers.

Why not investigate the big-unit economy of Mack Models LRSW and LRVSW. It will pay you to see these big jobs at work.

MACK TRUCKS Empire State Building, New York 1, N. Y.

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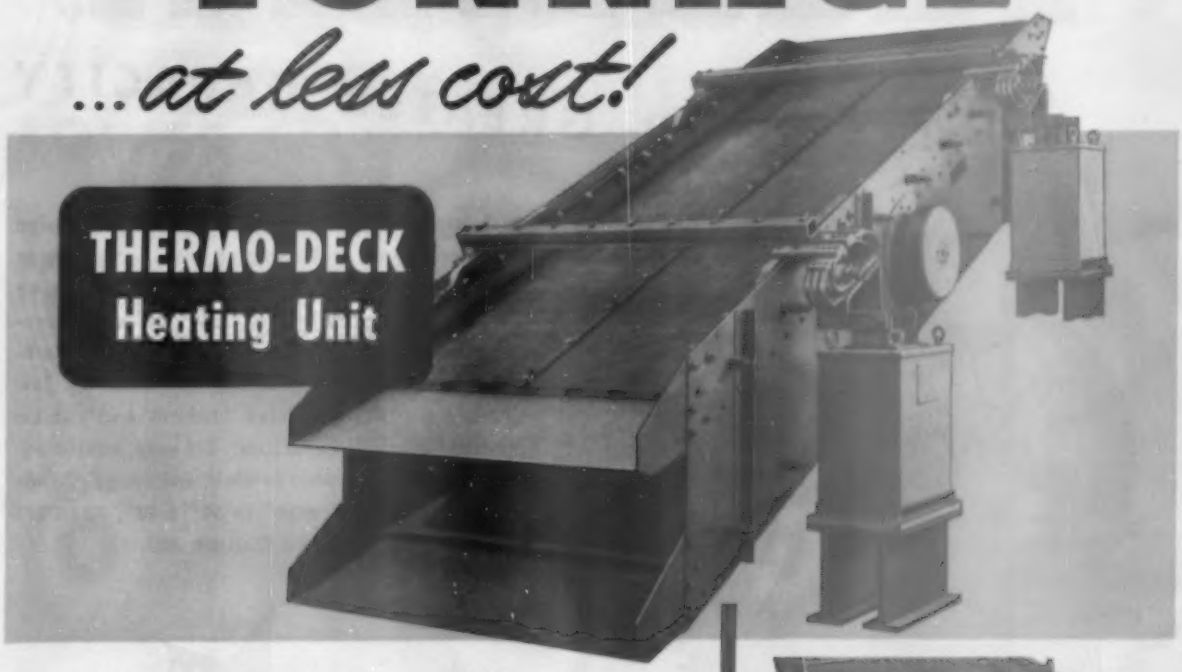
...at less cost!



Low Voltage Resistance Heating Prevents Moist Materials From Adhering to Screen Cloth

By keeping screen cloth clear, the *Thermo-Deck* heating unit increases capacity in two ways . . .

1. Screening efficiency is improved on a clean deck.
2. Converts downtime into production time by eliminating the need for manual cleaning of cloth.

Increases Cloth Life, Too— With a *Thermo-Deck* unit on the job, screen cloths last as much as three times longer than unheated screens. Because blinding is eliminated, the necessity for destructive pounding, brushing and flame heating is also eliminated.

Thermo-Deck units may be used on all vibrating screens handling fine moist material. Installations can be made on single-deck screens or on any deck of a multiple-deck unit.

A-4631

For Intermittent Feed, use Sta-Kleen Deck with Heating Unit

The use of a *Sta-Kleen* deck prevents fine materials from baking on screen during interruptions in feed. Rubber balls bouncing between the screen cloth and a retaining deck impart a dislodging vibration.

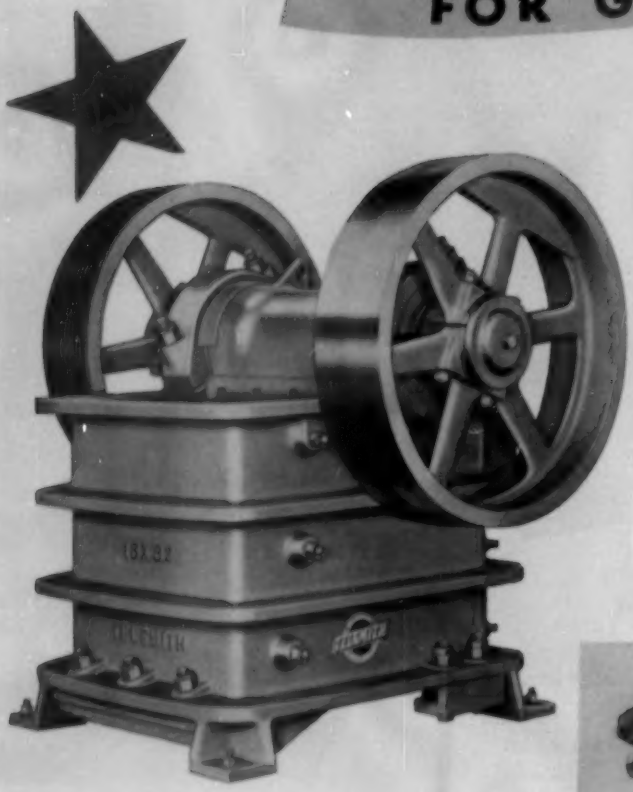
For complete information on the THERMO-DECK *heating unit, see your A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 07B7812A.*

Thermo-Deck and Sta-Kleen are Allis-Chalmers trademarks.

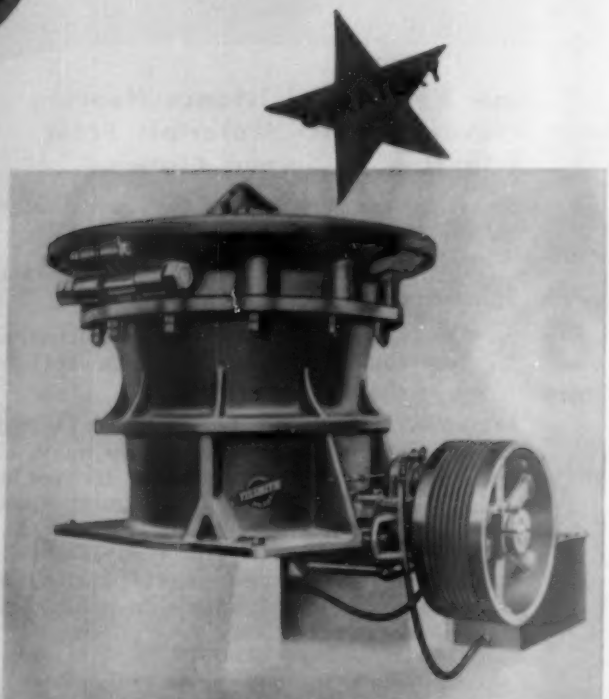
ALLIS-CHALMERS

TELSMITH PRIMARY

FOR GREATER CAPACITY



● **Telsmith Jaw Crusher** has a compact, massive cast steel frame and swinging jaw . . . with large cylindrical roller bearings throughout for higher speed, bigger capacity, and lower power requirements. With its vigorous, force feed, and remarkably effective crushing action, the Telsmith Jaw Crusher turns out a more uniform and cubical product, in larger capacities. Its easy, simple adjustment allows a wide product size range. Made in 9 sizes, from 10″ x 16″ to 30″ x 42″, 22 to 275 tons per hour. Send for Bulletin 280.



● **Telsmith Gyratory Breaker** is short and compact. Steel frame and crown, and rigid pillar shaft are all guaranteed against breakage. Largest feed and crushing areas of any gyratory breaker . . . the famous Telsmith parallel-pinch crushing stroke . . . cut steel drive gears, improved full, force-feed oiling and a roller bearing countershaft give not only faster crushing but crushing by impact, for a better cubical product. 6 sizes: 8B to 25B, 40 to 400 tons per hour. Get Bulletin 281.

SMITH ENGINEERING WORKS

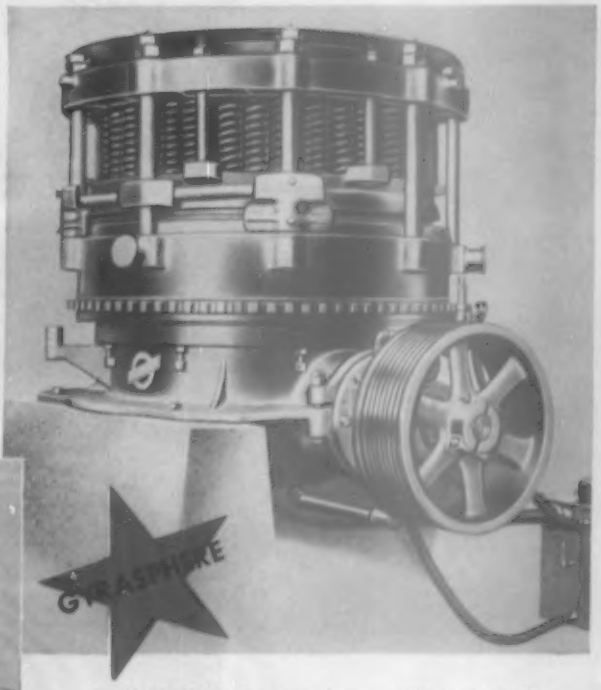
808 S. CAPITOL DRIVE MILWAUKEE 1, WISCONSIN

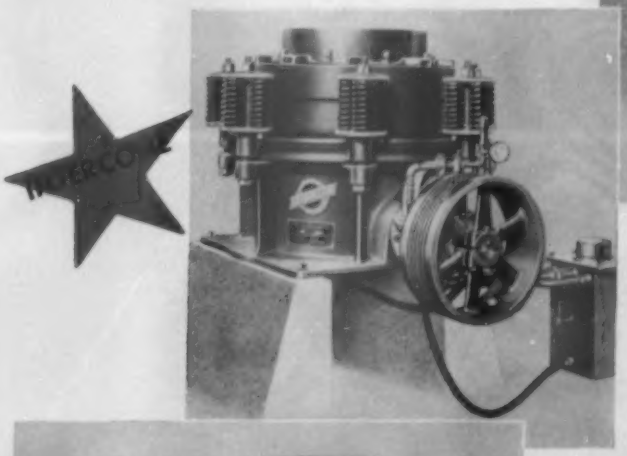
Representatives in Principal Cities in All Parts of the World ● Cable Address: Smengrks, Milwaukee

SECONDARY CRUSHERS

LOWER COSTS • BETTER PRODUCTS

● **Telsmith Style S Standard Gyrasphere** has new, heavier design with many time-tested features for greater capacity, a more uniform product, low-cost operation, and quick accessibility for easier maintenance. 24″ to 48″ sizes, coarse or medium bowl; 40 to 320 tons per hour. New 489-S size has 10″ receiving opening. *Style FC Fine Crushing Gyrasphere* has all Style S features with several additional fine crushing improvements. 24″ to 48″ sizes; medium or fine bowl, 6 to 130 tons per hour. Send for Bulletin 274.





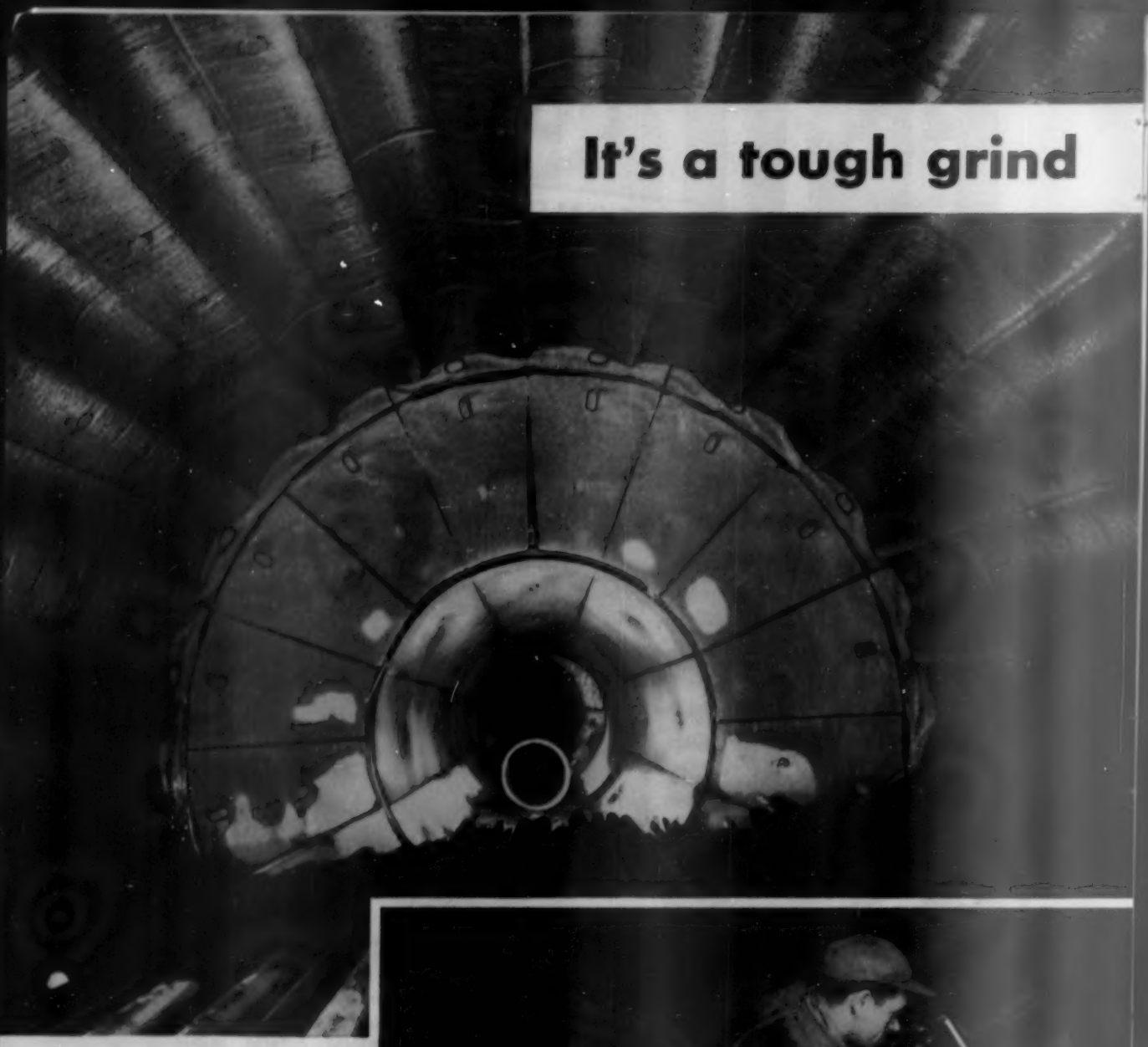
● **Telsmith Intercone** is an all-steel, high-speed, lower priced secondary crusher. Turns out very uniform, cubical, coarse or intermediate product. Lead bronze bearings, Telsmith patented rotary seal, roller bearing countershaft, full force feed oiling, spring relief protection. 18″ to 28″ sizes; 26 to 70 tons per hour. Get Bulletin 270.

● **Telsmith Double Roll** for large capacities of intermediate or fine aggregate at low reduction ratios. Compact, light in weight, low in cost. Anti-friction bearings run in oil. 24″ x 16″ to 40″ x 22″ sizes. 75 to 132 tons. Get Bulletin 282.

CS-6-R

SPECIALISTS IN THE DESIGN AND ENGINEERING OF COMPLETE AGGREGATE PLANTS

It's a tough grind



These photographs made inside one of Pilotac's Rod Mills clearly show the condition of the lining at the 680,000 ton mark. Notice the remaining wave as contrasted against the feed end liners.

SEE The United States Steel Hour. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

when you're handling Taconite...
so they use USS Lorain Rolled Plate Linings

GRINDING a material as hard as iron-bearing taconite is really a tough job. Many milling authorities agree that Minnesota's Taconite ranks among the hardest ores to grind. The linings in Grinding Mills are subjected to extremely severe abrasion and considerable impact. An extraordinary lining is required to pass such a test. Here is an actual case history of what USS Lorain Rolled Plate Linings can do.

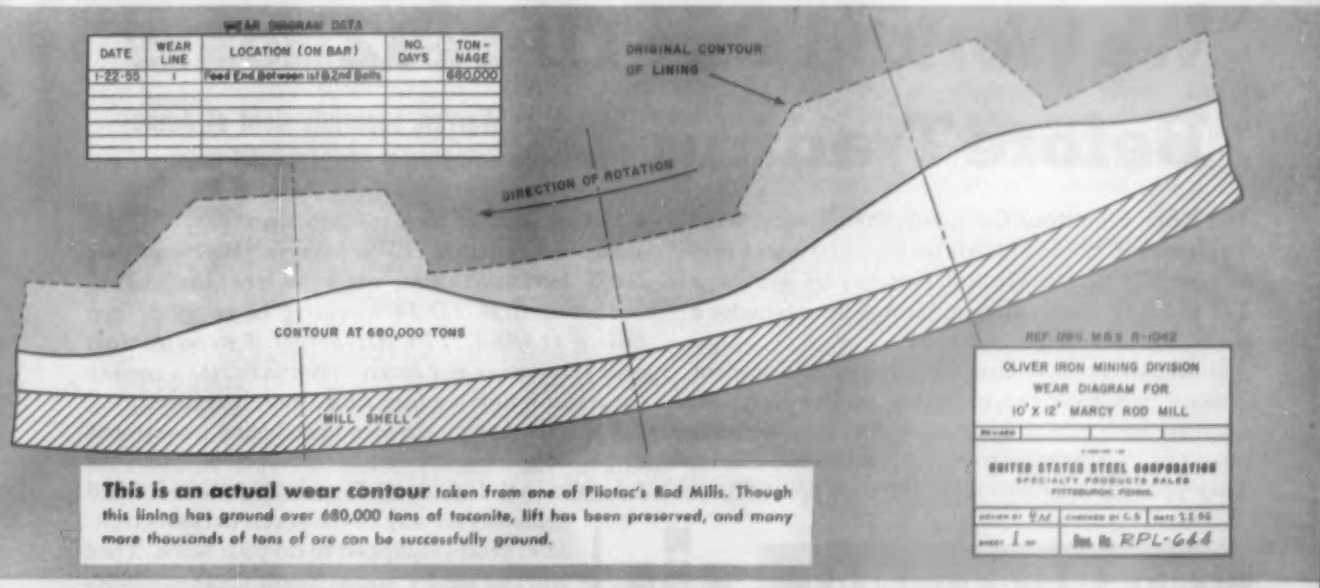
USS Lorain Rolled Plate Linings were specified for the 10' 8" Diameter Marcy Grinding Mills, built by the Mine and Smelter Supply Company of Denver, for "Pilotac"—Oliver Iron Mining's Pilot Taconite Plant at Mountain Iron, Minnesota.

Result: In one Rod Mill, over 680,000 tons of crude ore have been reduced by wet grinding from ¾" feed to a 10 mesh ball mill feed—yet lift has been maintained. Consider the punishment the mill linings have taken. A combination of the hardest of ores with a constant load of 70 tons of steel rods up to 4" in diameter have pounded away almost without stop. A study of the accompanying photographs and wear diagram indicates a considerable amount of lining remains—enough to grind many more thousands of tons of ore.

What makes this long life possible? USS Lorain Rolled Plate Linings are made of high carbon rolled steel liner plates and special heat treated alloy rolled steel lift bars. A marked differential in hardness favoring the lift bars is provided intentionally to maintain a constant lift height during the liner life and provide the rod or ball activity needed for efficient grinding. The wear on the harder lift bars, subject to both the abrasion of the ore and the impact of the rods or balls is thus correlated with the lesser wear on the liner plates caused primarily by the abrasion of the ore. Unlike castings, this "Dual-Hardness" feature insures lift until liner plates wear clear through to the shell. An additional feature of USS Lorain Rolled Plate Linings is the trouble-free special carbon manganese, heat treated, forged steel bolts used throughout. Operators readily appreciate the feature of "no bolt replacements." And closer tolerances between plates helps to eliminate shell wash and allied troubles that cause eventual wear to the mill shell.

Write to us now for the names of leading mill manufacturers who can supply you with USS Lorain Rolled Plate Linings.

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



This is an actual wear contour taken from one of Pilotac's Rod Mills. Though this lining has ground over 680,000 tons of taconite, lift has been preserved, and many more thousands of tons of ore can be successfully ground.

USS LORAIN ROLLED PLATE LININGS *and* USS GRINDING BALLS

S-862

UNITED STATES STEEL

TWELVE YEAR TD-14 PERFORMANCE RECORD prompts Acme to put 2 new TD-14As on expanded operations. Here one of new tractors dozes blasted limestone for shovel loading into haul trucks far below surface.

"We Worked Our TD-14 12 Years Before Trading"

Says E. H. Warren, superintendent of Acme Limestone Company's underground mine

The Acme Limestone Company, Fort Spring, West Virginia, got the low-down on durability and performance of INTERNATIONAL crawlers by working a TD-14 for 12 years piling up blasted limestone for a shovel in its underground mine.

With Acme expanding operations, this ancient crawler that took the pounding on the roughest, toughest assignment imaginable has now been replaced by two INTERNATIONAL TD-14As and dozers. They produce approximately 150 tons hourly from a 21-foot seam of high calcium limestone.

Superintendent E. H. Warren says, *"We have been 100% INTERNATIONAL on crawlers since 1942 with our first TD-14 working 12 years before being traded. The all-around production and service we get from INTERNATIONALS speaks for itself when we buy more as replacements."*

For a long-term, dividend-producing investment in pit or quarry crawler tractor power, see your International Industrial Power Distributor. He'll demonstrate any of the seven INTERNATIONAL crawlers equipped to do your work. Then you can see for yourself how these machines pay off with peak production in handling rock, gravel or sand at less cost.

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.

INTERNATIONAL
INDUSTRIAL POWER
MAKES EVERY LOAD A PAYLOAD

INTERNATIONAL HARVESTER

"Secret" of *lower* belt costs is concave sides

This brick machine at a western clay products company originally used a flat belt drive to transmit power. Belt slippage held production down and belt replacement was required twice a year. A Gates Vulco Rope drive, installed on this machine four years ago, eliminated the frequent belt replacements and increased production 15%.

Plants that keep track of costs on drives know this: they get longer wear at *lower cost per year of service* when they specify Gates Vulco Ropes—the V-Belts with *concave sides.*

Here's WHY concave sides keep belt costs down:

When the Gates belt is bent around the sheave, the *precisely engineered* concave sides (Fig. 1) fill out and become straight (Fig. 1-A). Thus the belt makes uniform contact with the sides of the pulley.

This full, uniform contact assures *even distribution of wear.* Naturally, *even wear* means *longer wear.* And longer wear cuts belt replacement costs...reduces down time...contributes to profits.

Prove to yourself the value of concave sides

Bend a straight-sided belt (Fig. 2) and feel the sides *bulge out* around the bend. You see immediately that the bulging sides prevent an even fit in the pulley groove (Fig. 2-A). Uneven contact causes faster wear...increases belt replacement costs.

Reduce costs and down time for belt replacements—specify Gates Vulco Rope Drives—the V-Belt with *concave sides* (U.S. Patent 1813698). The Gates Rubber Co., Denver, Colorado—*World's Largest Maker of V-Belts.*

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA 46-B

GATES VULCO ROPE DRIVES

3600-rpm explosion-proof motor with fan housing removed to show unidirectional fan.

These heat exchanger tubes

Protect this motor from dirt and corrosion

COOLING AIR is carried through the heat exchanger tubes with sufficient velocity to expel practically all kinds of dirt. If oily or sticky dirt should cling, tubes can be ramrodded clean on the spot in a few minutes because tubes are straight and tube ends are exposed. Also, the tubes are distributed uniformly around the perimeter of the stator yoke and along its full length — cooling all parts of the motor evenly.

Choice of Corrosion-resistant Materials

You can lick corrosion with this motor, too. Tubes are available in a variety of materials to meet practically any corrosive atmospheric condition. Allis-Chalmers tube-type motors have long and successful experience in such difficult applications as caustic plants, refineries and petrochemical plants, power plants with fly ash problems and many others.

Get Complete Information

Next time you need a motor for a dirty or corrosive location or for outdoor operation in all kinds of weather, call your Allis-Chalmers District Office. Get complete information on Allis-Chalmers tube-type totally-enclosed, fan-cooled and explosion-proof motors. Or write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 51B7149. Available in ratings on frames larger than NEMA 505 up to 3000 hp.

A-4559

ALLIS-CHALMERS

Well confined shot...well spread pile!

MISSION: Break a 20′ burden off a 68′ quarry face. Get good fragmentation. But hold down noise and vibration.

METHOD: Shoot it with Apex® explosives and ROCKMASTER® millisecond delay caps at the bottom of the holes.

COMBINATION SHOT: alternate pattern in center . . . progressive delays at ends. Bottom initiation gives good confinement. Toe moves out first. No geysers of escaping gases. Total power of explosives is put to work.

Entire burden is in motion. Center leads. Minimum air blast and vibration. No wild flying rock.

Shot gives good fragmentation . . . excellent control of throw. Muck pile well spread for easy digging.

THIS BLAST at Eastern Lime Corporation, Kutztown, Pa., shows the efficient action of Apex® cored explosives initiated with ROCKMASTER® millisecond delay caps at the bottom of the holes. Here's a 42,000 ton muck pile almost made to order! This shot paid off in easy digging!

Are results like this possible in your quarry? Ask your Atlas representative about this Rockmaster-Apex blasting combination which gives you greater efficiency, saves explosives . . . and keeps you on speaking terms with your neighbors.

GET "BETTER BLASTING"

If you are not already getting this informative periodical, let us put your name on our mailing list today.

(P. S.—Tell us who else in your organization should get "Better Blasting", too.)

BLAST DATA:

Height of face	68′
Burden	20′
Number of holes	20
Diameter of holes	6′
Depth of holes	75′ to 78′
Spacing	16′
ROCKMASTER delays	1 to 5
Stemming	17′ to 19′
Total tons	42,440
Total explosives (APEX #3 & APEX #4)	13,050 lbs.
Powder factor	3.2
Loading started	7:15 AM
Loading finished	11:30 AM
Blast fired	12 Noon

ATLAS

ATLAS EXPLOSIVES

"Everything for Blasting"

ATLAS POWDER COMPANY, WILMINGTON 99, DELAWARE

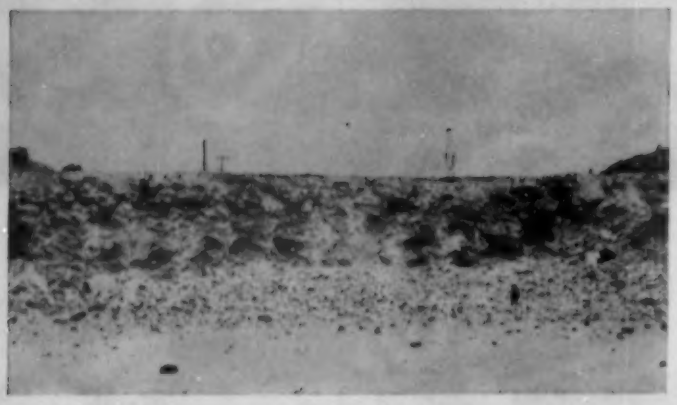
Offices in Principal Cities

USE THIS DU PONT BLASTING "TEAM"

for maximum strength and safety

Extra blasting strength and maximum safety tell the story at Jones & Laughlin's Millville, W. Va., limestone quarry. To get these results they've been using a Du Pont blasting "team" of "Nitramex" No. 2®, Pelletol No. 1 and MS-17 Connectors. The "before" and "after" photos below show you how effective this combination is.

1. 65′ face of "J & L" quarry, before the blast. This shot consisted of 21 holes loaded with approximately 18,000 pounds of Du Pont "Nitramex" No. 2. Into these, quarrymen poured 1000 pounds of waterproof, free-running Pelletol No. 1, to assure the maximum amount of energy at the bottom. Split-second delay interval between holes was provided by Du Pont MS-17 Connectors.



2. "Teamwork" brought down 46,000 tons of well-broken rock, with vibration and backbreak greatly reduced. Shows what "Nitramex" No. 2 plus Pelletol No. 1 can do! In addition to this consistently good breakage, the quarry reports that the "team" has brought greater safety, as "Nitramex" No. 2 is detonated by a "Nitramon" Primer, itself relatively insensitive. And MS-17 Connectors eliminate need for caps on the job until firing time.

IF YOU'RE NOT already using a Du Pont blasting "team," it'll pay to check into it. There's one such combination that's designed for your quarry. Get the complete story by contacting the Du Pont Explosives representative in your district. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

DU PONT BLASTING AGENTS

Products of Du Pont Explosives Research

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

PLYMOUTH WITH FULL PAYLOAD TAKES 11% GRADE IN STRIDE!

for BARBOURSVILLE CLAY MANUFACTURING COMPANY

Barboursville, West Virginia

OPERATES AT 98% EFFICIENCY!

Month after month, this 4-Ton Plymouth Model FL-2 Locomotive operates a minimum of 175 hours a month over an 11% grade with only 2 hours out for routine maintenance. That's 98% efficiency!

Hauling heavy loads of clay from pit face to crusher, this powerful Plymouth keeps costs down . . . production up!

"Our track grade is about 11% with plenty of tight curves, but our Plymouth handles the job with ease," states Mr. Herbert Desais, company superintendent. "Moreover, we like its economy and simplicity of operation. Continuous operation eight hours a day takes only 15 gallons of gas."

You will find *every Plymouth* designed to "make the grade" with tough hauling jobs. Models range from 3 to 70 tons, with gasoline, Diesel, or Diesel-Electric power and mechanical or Torqomotive* Drive. Get full information by writing for free catalog or sending a brief of your operating requirements. Address: PLYMOUTH LOCOMOTIVE WORKS, Division of THE FATE-ROOT-HEATH COMPANY, Dept. A-5, Plymouth, Ohio.

PLYMOUTH® TORQOMOTIVES

*Torqomotive Drive: Plymouth transmission with hydraulic torque-converter.

ALSO MANUFACTURERS OF F-R-H CERAMIC MACHINERY

"Torture-Testing" Builds Axles that can take it. In our indoor proving ground, we have concentrated every hazard of a million miles of driving. TDA axles prove themselves against tests like this one . . . where an axle shaft is twisted 14° backwards and forwards, 36 times a minute, for months on end. Other tests simulate a 3,000 mile uphill haul with a full load. Only tests this rugged could produce axles this serviceable.

HEAVY LOADS ARE PAYLOADS

...and exclusive Timken Inter-Axle cab controlled lockout at any speed!

Every heavy trucker has *two* big problems to lick.
First, to deliver *more payload* faster. Second, to get the *most service* out of his equipment . . . with less maintenance costs, less downtime.

Timken-Detroit has spent 37 years developing the most helpful answer to heavy hauling! The TDA Tandem Drive Rear Axle Unit! The lightest, strongest, most serviceable unit of its kind ever produced.

Engineering is the keynote of TDA Tandem superiority. Unlike ordinary tandems, in TDA Straight Line Drive, propeller shafts form an absolutely straight line from the forward rear axle back to the rearmost axle. This permits smoother transmission of power, no noisy *around the corner operation.*

Other TDA Tandem design advantages give you longer trouble-free service, quieter, more economical performance, bigger savings on man and equipment time. Maintenance is easier, too. TDA design allows almost complete interchangeability of parts between four and six-wheelers. Solid benefits explain why TDA is the choice of manufacturers and operators everywhere.

How TDA Inter-Axle Differential cuts truck and tire wear! With cab-controlled lockout!

When tandem tires are mismatched...or when tandem trucks are going over rough grades . . . one set of wheels must turn faster than the other or be dragged. TDA Inter-Axle Differential permits either wheel to do this when necessary. Also, with TDA, the driver can, when necessary, lock out the differential and obtain a straight-through drive in mud or sand.

THREE TYPES: Hypoid-helical double-reduction, optional inter-axle differential worm drive, without inter-axle differential.

For six-wheeler operation . . .

THE TDA TANDEM DRIVE REAR AXLE UNIT

Now—the *world's finest* tandem drive rear unit for heavy-duty motor trucks!

And with these features, developed, introduced and pioneered by TDA: (1) Available in 3 types of final drives and 3 capacities. (2) Top-mounted straight-line final drive eliminates propeller shaft angularity. (3) Optional inter-axle differential . . . spur gear design, cab-controlled power-lockout. (4) Torsion flow axle shafts . . . guaranteed for 100,000 miles or three years, whichever occurs first. (5) Hot forged steel axle housing . . . guaranteed for the life of the vehicle. (6) Unit-mounted "P" series power brakes . . . for longer life, greater economy and efficiency. (7) Cradle ride spring suspension and paralleled torque rod system . . . maintain correct alignment and weight distribution regardless of driving and braking conditions. (8) Exclusive two-piece trunnion tube bracket speed servicing. (9) Removable torque rod and spring guide brackets . . . for positive alignment, easier replacement. (10) Rubber torque rod bushings and rubber spring seat bushings . . . eliminate metal-to-metal contact. Require no lubrication.

WITH TDA TANDEMS

Differential that permits

TIMKEN Detroit AXLES

ROCKWELL SPRING AND AXLE COMPANY

Accepted TDA Standard

TRADE MARK REGISTERED

World's Largest Manufacturers of Axles for Trucks, Buses and Trailers

Plants at: Detroit, Michigan • Oshkosh, Wisconsin • Utica, New York • Ashtabula, Kenton and Newark, Ohio New Castle, Pennsylvania

ONLY TDA BRAKES give all these tested advantages!

- Brake shoes made of steel save up to 40 pounds per axle . . . give strong braking action with no distortion.
- Patented liner shape—thickest where wear is greatest.
- Liners riveted on—no chance of movement on shoe.
- Liners circle-ground to cover all efficient braking area of shoe.
- Rustproofed anchor pins locked in. Ends of pin sealed against foreign matter.
- First with self-aligning camshaft housings.
- Cam rollers heat-treated to roll smoother, wear longer.
- First with all-Nylon camshaft bushings.
- Compare similar products part for part and prove to yourself that TDA brakes incorporate the finest quality materials, skilled workmanship and advanced design.

No job too tough—No service too severe

MONARCH WHYTE STRAND Wire Rope

Put MONARCH WHYTE STRAND Wire Rope to the test on your equipment. It is built to give better service in the toughest going.

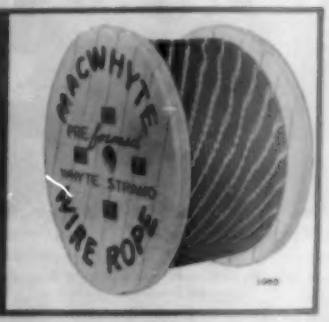
There is a Macwhyte Rope in the proper size and construction to meet every equipment need and every service condition. WHYTE STRAND Wire Rope is designed with the end use in mind . . . to provide the features that will give outstanding and economical service on your equipment.

MONARCH WHYTE STRAND is supplied in a *thousand and one* types, sizes, and grades. It is made Internally Lubricated, PREformed or non-PREformed, Lang Lay or Regular Lay, with Fiber Core or Independent Wire Rope core. Wire combinations in one single rope vary from 42 wires in 6 x 7 construction to 343 wires in 6 x 49 IWRC. WHYTE STRAND is made in all Wire Rope Classifications . . . so there is a *right* rope for every equipment need.

Write for MONARCH WHYTE STRAND Bulletin 5425

For proper wire rope size and construction for your equipment, request a Macwhyte recommendation.

MACWHYTE WIRE ROPE



EDITOR'S PAGE

More Research Needed at Production Level

INVESTMENT IN RESEARCH by American industry and government is approaching four billion dollars annually, ten times the rate before World War II, which reveals growing appreciation of the necessity for research. That is the current price being invested for developing new materials, products and improved processing to keep abreast competitively and in planning for the future. The aggregates industries haven't kept pace.

Certainly, each producer cannot be expected to set up his own research department and laboratory to solve problems confronting his entire industry but he does have recourse to group effort. Such problems are for trade association research and, to keep pace with all industry, it is up to far more producers to join forces with and provide necessary financial and participation support to associations serving their industries.

Trade associations in these fields have done remarkably well with their available resources and many non-contributors are in business today only because of association accomplishments in research and engineering.

Many problems remain unsolved and some of them are gaining in importance. They may even be relatively rare in occurrence but are individually important when faced up to by any producer. Group action can often help here too, and does, but each company, it seems, could well afford to do more critical and exhaustive investigation on its own too, in order to discover new facts and interpret them for practical application. We refer particularly to research in production.

The crushed stone and the sand and gravel industries each have an annual sales volume about a half billion dollars and their selling prices have changed little in twenty-five years. That fact proves progress in efficiency but it also points up the need for facing and solving many production problems in order to continue to live with such competition. The matter of improving quality and the utilization of wastes for profit likewise assume more importance.

Problems of segregation and sizing of materials have been talked about for years but they need lots of study. Poor sizing of aggregates is the most frequent cause for rejection and requires much improvement.

Often, sizes shipped are just a compromise between what the customer really wants and what the supplier thinks he can produce economically. The customer may go along with it for awhile but he won't necessarily if someone else will come along and meet his definite requirements. Research into methods to modify size distribution would be justified if a better product resulted without much added cost.

Size segregation in handling and in loading are still with us, to cause rejections of otherwise well-sized materials, and it deserves exhaustive study to devise economical means of solution. It goes further than finding the best ways of dropping finished sizes into piles, or bins, or cars and suggests looking into stockpiling methods. Use of bulldozers and scrapers for extension of stockpiles and recovery therefrom results in degradation which has not been measured or really studied. Research might well result in changing handling methods to reduce unwanted fines resulting from present handling practices.

Research in processing seems most badly needed in the excavation of sand and gravel and stone, for therein lies greatest opportunity to cut costs. There continue to be many sand and gravel producers who have not explored methods to dispose of surpluses within their excavations, but carry them on through the plant for later discard and thus add to processing costs.

Much drilling and blasting continues to be done by the "trial and error" approach, whereas a real need exists for critical experiment and investigation of that phase of operation. What first is needed is determination of a basis for evaluating results, preliminary to conducting well-recorded experiments leading to specific conclusions as to optimum practice. Records of shovel loadings might serve the purpose.

It is doubtful if very many small crushed stone producers have the facts at hand to know that a very substantial increase in primary drilling and blasting costs may often be justified, dollar-wise, when overall results are analyzed. Primary crusher hang-ups, if they be minimized, may well warrant radical blasting changes through greatly increased overall results, which is what counts after all. But where is the point at which such changes result in excess fines to be wasted or sold at a markdown? Such are the questions to be answered by research.

There's nothing really new about the foregoing, which we mention only as examples, but these production problems and many more like them that exist throughout plant operations need emphasis and re-emphasis because there is an inclination to overlook their importance. Even the bigger and better quarries admit to ten or twelve percent downtime from primary crusher jams alone. Think of the loss in dollars and ask whether other industries would permit it!

Bror Nordberg

How CAT* DW20s CUT STRIPPING COSTS 20%

Lee Stephens, Inc., uses two Caterpillar DW20 Tractors with No. 20 Scrapers to strip overburden at this gravel pit—for *20% less money* than the previous contractors using other methods. Each DW20 moves 2500 cu. yd. in eight hours. Lee Stephens, owner of the contracting firm, says that DW20s and No. 20 Scrapers are ideal for this job at Tracy Rock and Gravel Co., Tracy, California.

Here are some of the reasons for this cost-cutting performance: the husky Caterpillar Diesel in the DW20 puts out 275 HP (A.S.M.E.)—power aplenty for fast acceleration, fast hauls, and pulling through rough spots. It can highball at 34.1 m.p.h., using money-saving No. 2 furnace oil. Such features as long-lived aluminum alloy main and rod bearings, "Hi-Electro" hardened crankshaft, truly efficient engine filters and seals, and heavy box-type main frame mean that the Caterpillar DW20 stays on the job and out of the shop.

Large tires give excellent flotation and traction on wet surfaces and uneven terrain. The DW20 has clutch and steering boosters and air brakes to minimize operator fatigue. Matched with the No. 20 Scraper, it makes a balanced, easy-handling unit. The No. 20 Scraper takes on its full load of 20 cu. yd. (23 cu. yd. with sideboards) quickly, with a live, boiling action. Top-of-bowl design is clean and uncluttered for good operator visibility and efficient shovel loading.

Your Caterpillar Dealer can prove to you that the DW20 and No. 20 Scraper can do *more work* at *lower cost* on *your* operation than *any* competitive unit. See him today. And call him whenever you need dependable, factory-trained service and genuine factory parts.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

Helpful Text on Engineering Materials

ROCKY'S NOTES

NATHAN C. ROCKWOOD

WHEN AN AUTHOR BEGINS his text with the statement: "Since matter consists of atoms, any fundamental attempt to understand its properties must depend upon the study of atomic structure and interatomic forces;" it at once appeals to us, for we have been harping on the same theme these several years. The textbook that opens thus is "Chemical Constitution and Properties of Engineering Materials,"* by Dr. P. C. Carman, principal research officer, National Chemical Laboratory, Pretoria, South Africa. It is an English book, published by Edward Arnold & Co. in 1949, which unfortunately we did not know about until recently, when one of the friendly readers of our articles and Notes on portland cement chemistry called the book to our attention. A prior acquaintance with this textbook would have smoothed our understanding of atomic structure and bond relationships very materially.

Of course we were familiar with some of Dr. Carman's research work because it is referred to often in various texts we have read on structural chemistry and colloid chemistry. T. C. Powers and H. H. Steinour, of the Portland Cement Association research laboratory, quote from one of Dr. Carman's papers in their discussion of colloidal silica in "An Interpretation of Some Published Researches on Alkali-Aggregate Reaction, Part I—The Chemical Reactions and Mechanism of Expansion," in the February 1955 issue of the *Journal of the American Concrete Institute*. We doubt, however, if many American students are familiar with the textbook we have before us. They should be, for we are certain that it would prove a big help in understanding some of the advanced chemistry not only of cement and concrete, but of iron, steel and alloys, aluminum, magnesium, clay products, etc.

Dr. Carman's book is especially helpful because it is written for engineers and other technical men with merely little more than an elementary knowledge of modern chemistry and not for the experts. Hence, the language can be readily understood by such as ourselves, who have not devoted a lifetime to study of structural chemistry and to research. His approach to the subject also will find many sympathetic thinkers who find some shortcomings in the common methods of approach to writing specifications. In his preface he says: "Engineering materials cannot await the gradual growth of fundamental scientific knowledge. They must be described and specified, and this is done in terms of more or less arbitrary tests when no others are available, thus creating an apparent division between methods and data of 'pure' and 'applied' science." The object then is to apply such knowledge of "pure" science, as has been gained, to practicable understanding of the properties of engineering materials.

*Available from St. Martin's Press, Inc., 103 Park Ave., New York 17, N. Y., price $10.00

Subjects Covered

We will first list the chapter headings and then refer more specifically to the chapters which should be of the most interest and value to our particular readers. These chapter headings are: (1) Interatomic Forces and the Crystalline State: (2) Deformation of Metals; (3) Binary Alloys and Their Heat Treatment; (4) Carbon Steels; (5) Alloy Steels; (6) Cast-Irons; (7) Non-Ferrous Metals; (8) Corrosion of Metals; (9) Theory of Electrochemical Corrosion; (10) Electrochemical Corrosion in Practice; (11) Protection Against Corrosion; (12) Structure and Origin of Inorganic Materials; (13) Clays; (14) Ceramic Wares; (15) Refractories; (16) Cements and Related Materials; (17) Silicate Glasses; (18) Resins and High Polymers; (19) Properties of High Polymers; (20) Natural Rubber and Synthetic Elastomers; (21) Cellulose and Polysaccharides; (22) Proteins; (23) Drying Oils, Natural Resins, Bitumens, Carbons; (24) Synthetic Resins; (25) Fuels and Their Combustion; (26) Solid Fuels; (27) Liquid Fuels; (28) Gaseous Fuels; (29) Water Treatment.

The first chapter explains atomic structure and the periodic system of the elements, the nature of atomic bonds, interatomic forces, energies and distances, states of aggregation, the crystalline state, including descriptions of x-ray analyses and their interpretations; the essentials of crystallography; metallic bonding; classification of crystal structures; intermediate modes of chemical bonding. This chapter gives in authoritative and relatively simple terms some of the things we have endeavored to bring out in our series of articles on the "Prospective Chemistry of Cement and Concrete." As one reads on it is clear that many more of these principles have been applied in studying metals than in the case of cement and concrete. Of course, it is much easier to study the crystal composition of metals, and much more research has been applied than in the case of cement and concrete.

The chapters on metals are helpful, even to chemists in cement or lime plants, particularly if they share any responsibility for selecting or specifying purchases of machinery and repair parts. Only with such knowledge as this book can supply are they able to understand the reasons for poor service and high cost of repairs if their selections are not appropriate for the conditions to be met. The manufacturer may make many claims, but the purchaser should be in a position to know how many of such claims rest on scientific grounds. Moreover, a knowledge of the structure of metals is helpful to an understanding of all crystalline materials, which include cement and concrete in their final form.

Silicates

Turning to Chapter 12 on the "Structure and Origin of Inorganic Materials," we find most of it devoted to silicate minerals. As has been explained in various issues of ROCK PRODUCTS, the structures of the silicate minerals have been pretty well established—silicon-oxygen tetrahedra, isolated or bonded together in chains, rings or sheets, being the essential part of the structures. A considerable part of this chapter is on the subject of economic geology—the utilization of various rocks and minerals. The subject of Clays is covered in the following chapter, and Ceramic Wares in the succeeding one. These chapters are different from some of the books on clay that we have reviewed here, in that Dr. Carman's text is more concerned with what heat treatment does to clays than with their geological origins. Refractory products are treated in a similar manner.

The chapter 16 on "Cements and Related Products" is, of course, the

(Continued on page 138)

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LABOR RELATIONS TRENDS

By NATHAN C. ROCKWOOD

Employer-Group Labor Contract Withstands Acid Test

PRODUCERS OF AGGREGATES, in metropolitan centers anyhow, have learned by experience the advantages of handling their union-labor contracts on a group basis. There are, however, certain precautions to be observed, as is illustrated in the case which follows: National Labor Relations Board v. Spaulding Avery Lumber Co., decided April 7, 1955, by the U. S. Circuit Court of Appeals, Eighth Circuit, St. Louis, Mo. The employers won their case, apparently only because the Teamsters' Union officers jumped the gun and struck two of the operations, while the employers were showing signs of weakening. The complete text of the Court's decision follows:

"This matter is before us on petition of the National Labor Relations Board to enforce its order requiring respondents to cease and desist from: '(a) Discouraging membership in General Drivers, Warehousemen and Helpers Local Union No. 383, affiliated with International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America, A.F. of L., or in any other labor organization of its employes, by locking them out or otherwise discriminating in regard to their hire and tenure of employment or any term or condition of employment: (b) In any other manner interfering with, restraining, or coercing its employes in the exercise of the right to self-organization, to form labor organizations, to join or assist General Drivers, Warehousemen and Helpers Local Union No. 383, affiliated with International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America, A.F. of L. or any other labor organization, to bargain collectively through representatives of their own choosing, to engage in concerted activities for the purposes of collective bargaining or other mutual aid or protection, or to refrain from any or all of such activities, except to the extent that such right may be affected by an agreement requiring membership in a labor organization as a condition of employment as authorized in Section 8(a)(3) of the Act.' "and to take certain appropriate affirmative action. At all times pertinent to the issues here involved respondents [the employers] were engaged in retailing coal, lumber, liquid fuels and related products at Sioux City, Ia. and South Sioux City, Neb. They were all members of a nonprofit corporation known in the record as the Sioux City Coal Merchants Association. The employes of the respondents for collective bargaining purposes were represented by General Drivers, Warehousemen and Helpers Local Union No. 383, affiliated with the International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America, A.F. of L., while respondents were represented by the Sioux City Coal Merchants Association, and various contracts had been negotiated between the employes and the respondents, the last of which was negotiated November 5, 1951, for a period ending March 31, 1952, and from year to year thereafter in the absence of sixty days' notice to modify or terminate.

Facts of Case

"On January 28, 1952, the union requested and on January 29, 1952, the representative of the association agreed to negotiations for changes in the then current contract. The negotiations were carried on on behalf of respondents by a committee of their association and on behalf of the employes by a committee of their union. These negotiations continued up until about July 15, 1952, without agreement as to the terms and conditions of a new contract. On July 17, 1952, the union notified the association that it desired to bargain separately with each individual member of the association. In response to the notice, the association speaking for the respondents on July 18, 1952, wrote the union saying in part:

" '* * * They all feel that in view of the long history of collective bargaining as an association and the fact that contracts have been so negotiated for a number of years, that we should continue, if possible, in that manner.

" 'However, they are all willing to make a good faith effort to reach an agreement by individual bargaining if that is your desire.

" 'Accordingly, I am authorized by each of the individual employers to arrange with you for bargaining conferences at your convenience. * * *'

"On the following day the union speaking for the employes wrote the association saying:

" 'Received your letter this A.M. and would be pleased to meet with you.

" 'Strike notice has been sent to Mr. Walensky and Mr. Schoeneman for Wed. 7 A.M. July 23, 1952 copy of which I am enclosing herewith.

" 'If you desire a meeting please advise.'

"Responding to this action by the union the association wrote the union saying in part that:

" 'I have your letter of July 19, 1952, enclosing copy of letter of July 19th sent to Walensky Lumber Company and the Schoeneman Lumber Company, advising that a strike will be called against the two named companies at 7:00 o'clock A.M., Wednesday, July 23, 1952.

" 'We had assumed that the union desired a negotiation conference with these companies to attempt to work out individual contracts prior to taking strike action. However, you have apparently concluded that such conferences would be ineffective in view of the history of bargaining with the association representing the employers.

" 'At a meeting of the individual members of the employers association held today, I was authorized and directed to advise that in the event of strike action being taken by the union against any individual member or members of the association, all association members will treat such action as a strike against each of them and will act accordingly. * * *'

"Following these preliminary negotiations, the respondents on July 22, 1952, notified their employes that they were being laid off because the union had called a strike against respondents Walensky Lumber Co. and Schoeneman Lumber Co.

"Negotiations between the union and the association were resumed on the 28th day of July, 1952, and a settlement was finally agreed upon and a new contract was negotiated on August 7, 1952. There were no negotiations between the union and the individual respondents.

N.L.R.B. Argument

"It was the contention of respondents before the Board, and they renew that contention here that the lockout was solely for economic reasons and hence did not constitute a violation of the Act. But the Board, expressing the view that conceding *arguendo* that the lockout was solely for economic reasons, concluded that the respondents

(Continued on page 142)

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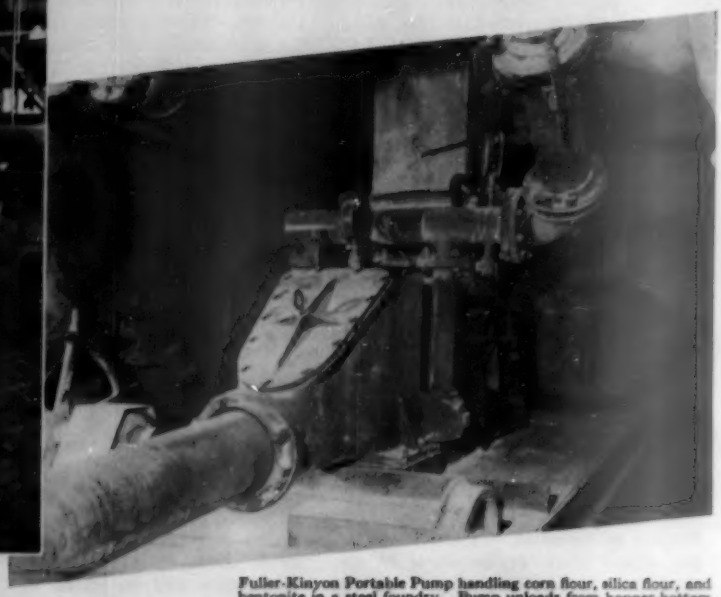
Fuller-Kinyon Stationary Pump installed in an electric-utility, power-generating station, conveying fly-ash from boilers to a storage silo. Fuller Rotary Compressor (left in photo) furnishes air direct to pump for conveying.



Fuller-Kinyon Portable Pump handling corn flour, silica flour, and bentonite in a steel foundry. Pump unloads from hopper-bottom cars and conveys to storage; from storage to supply bins over mixers.

Fuller-Kinyon Remote-Control Unloader unloading Portland cement from a river barge. Unloaders are used for conveying from barges, box cars, and flat-bottom storage bins.

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PEOPLE
IN THE NEWS

Universal Appointments

ROALD W. NYGAARD, assistant manager of the Buffington, Ind., plant of Universal Atlas Cement Co., New York, N. Y., has been appointed plant

Roald W. Nygaard

manager of the Duluth, Minn., plant. He succeeds Martin E. Linquest, who has retired after 46 years of service. Sidney C. Englin, general operating foreman at Buffington, has been appointed assistant plant manager, succeeding Mr. Nygaard.

Mr. Nygaard, a native of Chicago, Ill., attended the University of Illinois, Urbana, Ill. He joined Carnegie- Illinois Steel Corp. in Chicago in 1930

Martin E. Linquest

and five years later transferred to the Gary Works. In 1944, he became assistant to the division superintendent and four years later transferred to the Pittsburgh office as labor analyst. In 1948, he returned to Gary Works as assistant to the division superintendent. Later that year he was appointed supervisor of industrial relations at the Buffington plant of Universal Atlas and was promoted to assistant plant manager in 1954.

Mr. Linquest, a native of LaPorte, Ind., joined the company in 1909 as a tester at the Buffington plant. In 1917, he was transferred to the Duluth, Minn., plant where he subsequently became employment and safe-

Sidney E. Englin

ty inspector. Two years later, he was promoted to operating foreman. He was appointed assistant plant manager in 1943 and plant manager in 1951.

Mr. Englin, a native of St. Paul, Minn., joined the company in 1918 as clerk at the Buffington plant and served in various capacities until his appointment in 1952 as general operating foreman.

Patton Named President

ROBERT M. PATTON has been elected president of the New York Coal Co., Columbus, Ohio. He succeeds G. K. Mitchell, retired, who has been named vice-chairman of the board. Mr. Patton has been associated with the company for 15 years, and has been serving as executive vice-president since 1949. Other officers of the company are Edwin H. Davis, chairman of the board; George W. Quillin,

Robert M. Patton

vice-president, secretary and treasurer; Pauline Donley, assistant secretary, and John K. Long, controller and assistant treasurer. William A. Rodgers is manager of the Basic Construction Materials Division, Chillicothe, with plants at Circleville, Chillicothe, Waverly, Sargents and Ironton. Leo L. Davis is division manager of the Plum Run Stone Division and Highland Stone Division, Peebles and Hillsboro, Ohio.

Robinson Named Vice-President

J. H. ROBINSON has been appointed vice-president of Gypsum, Lime and Alabastine, Canada, Ltd., Paris, Ontario, Canada. He has been a member of the operating staff of the company since 1921, having been previously associated with the gypsum industry in the United States. He was appointed general works manager in 1951, was elected to the board of directors in 1952, and was appointed general manager in 1953. Mr. Robinson is a member of the Association of Professional Engineers of the Province of Ontario and of the Canadian Institute of Mining and Metallurgy. He has served on Committee C-7 of the American Society for Testing Materials and also is a member of the National Lime Association, Washington, D. C.

U. S. Gypsum Promotions

CHARLES B. ALVORD, formerly works manager of the Warren, Ohio, plant of United States Gypsum Co., Chicago, Ill., has been promoted to manager of all manufacturing personnel in the U. S. and Canada. He will be succeeded as works manager by John H. Daugherty, operating superintendent at the plant.

Mr. Alvord, a native of Chicago, Ill., joined the company in 1940 and five years later he was appointed assistant merchandising manager of industrial roofs and steel. In 1947, he became sales engineer in the Cleveland office and the following year was appointed district manager of the northwestern industrial sales division. He was made manager of the defense materials department in 1951 and works manager of the Warren plant in 1952.

Mr. Daugherty, a native of Warren, Ohio, attended Mount Union College, Alliance, Ohio, graduating in 1940 with a B.S. degree in chemistry. After five and one-half years' service in the U. S. Navy, he joined U. S. Gypsum Co. in 1947 as a production trainee and later became production foreman. Two years later he was transferred to the Boston, Mass., plant where he served as general foreman. In 1951, he went to the Philadelphia plant as board plant superintendent, which position he held until his present appointment.

Donaldson Named President

GEORGE H. DONALDSON, vice-president in charge of operations at the Carbon Limestone Co., Carbon, Penn., since 1950, has been elected president of the firm to succeed Frank B. Thacher, who becomes chairman of the board. Mr. Donaldson is also vice-president of the Carbon Concrete Brick Co. and LayRite Concrete Products Co. Philip E. Heim was re-elected vice-president in charge of sales; John A. Bannach, treasurer; Miss Hilda G. Wilton, secretary; and Miss Catherine Mylott, assistant secretary. Mr. Thacher joined the company as president in 1948, succeeding George O. Earnshaw. Prior to that he was manager of the electrode division of Great Lakes Carbon Corp., Niagara Falls, N. Y.

Bethlehem Promotions

HARRY W. CAMPBELL has been promoted to superintendent of the Bethlehem Quarry Co., Hanover, Penn., subsidiary of Bethlehem Steel Co., to succeed Anthony F. Strazzella, who died April 10. Mr. Campbell was formerly master mechanic at the Hanover quarry and will be succeeded by Francis H. Thomas, who held the same position at the Bridgeport quarry. Earl K. Leedecker, assistant superintendent of the Bethlehem slag plant, has been named master mechanic at Bridgeport, while Thomas C. McPyle, Jr., who has been assistant foreman at Hanover since 1952, becomes general foreman of the slag plant.

Engineering Superintendent

OAKLEY K. PORTER has been appointed engineering superintendent at the Farnams, Mass., lime and limestone plant of United States Gypsum Co., Chicago, Ill., according to an announcement by E. E. Long, works manager. Mr. Porter is a graduate of Bay Path Institute with a degree in finance and accounting and of the University of Maine, Orono, Me., with a B.S. degree in civil engineering. He joined U. S. Gypsum in July, 1954, and has undergone a training course in all departments for the past six months.

Wolfe Named Chief Engineer

J. M. WOLFE, formerly with Allis-Chalmers Manufacturing Co., Milwaukee, Wis., and more recently assistant chief engineer for the Traylor Engineering and Manufacturing Co., New York, N. Y., has been appointed chief engineer for the Missouri Portland Cement Co., St. Louis, Mo., according to an announcement by L. A. Wagner, director of engineering and research.

Cement Consultant

DANIEL W. YIKE, former chief chemist of the Volunteer Portland Cement Co., Knoxville, Tenn., has been appointed cement consultant on the use of cement mill products in Mississippi, Alabama, Georgia, South Carolina and Tennessee, for the Dewey and Almy Chemical Co., Cambridge, Mass., and sales engineer for J-W Materials, Inc. Mr. Yike was associated with Master Builders Co., Atlanta, Ga., as a salesman and later as manager of its Dixie division from 1946 to 1952. Previously he served for several years as chief chemist of the Volunteer Portland Cement Co. and prior to that was associated with the General Portland Cement Co. in Michigan, the Southwestern Portland Cement Co. in Ohio, and the Lehigh Portland Cement Co. in New York.

Daniel W. Yike

A.R.B.A. Chairman

J. E. MCCRACKEN has been appointed chairman of the executive committee on materials and supplies, American Road Builders' Association, Washington, D. C. Mr. McCracken is sales engineer for Bethlehem Steel Co., Bethlehem, Penn. Among the members of the governing committee are: E. W. Bauman, managing director of the National Slag Association, Washington, D. C., vice-chairman; John Ruhling, Washington representative, American Concrete Pipe Association; Frank B. Brown, managing director, Wire Reinforcement Institute; J. E. Buchanan, president, The Asphalt Institute, College Park, Md.; and George H. Kimber, president, Calcium Chloride Institute, Washington, D. C.

Director of Advertising

B. G. POMFRET, formerly publications manager, has been appointed director of advertising and publications of United States Gypsum Co., Chicago, Ill. He previously served as commodity advertising manager and advertising manager, and has been publications manager since 1953. He will be succeeded in this position by C. A. Wayman, formerly editor of U. S. Gypsum's external house organ "Popular Home" magazine. D. E. Nugent, associate editor, replaces Mr. Wayman as editor of the magazine.

Receives Citation

PAUL E. LAWRENCE, owner and manager of the Lawrence Bros. Concrete Products Co., Winfield, Kan., was recently presented the Distinguished Service Award of the Winfield Junior Chamber of Commerce. This award was made to him for his contribution to community, business and civic life; willingness to cooperate with other than his own groups; and advancement in his own business. Mr. Lawrence and his brother, John, started the concrete products company in 1947, and he took over complete ownership in 1951.

Kaiser Managers

JAMES A. WILSON has been appointed plant manager of the Baton Rouge, La., alumina plant of Kaiser Aluminum & Chemical Corp., Oakland, Calif. Ray Woodman, who has been manager of operations at Baton Rouge, has been named manager of the raw materials division, which includes the Baton Rouge plant and the Jamaica bauxite mining operations. Prior to joining Kaiser Aluminum, Mr. Wilson served as manager of the chemical phosphates department of International Minerals and Chemical Corp. at Bartow, Fla. He received his B. S. degree in chemistry at Clemson Agricultural College, Clemson, S. C., in 1930, and the following year did graduate work in chemical engineering at Massachusetts Institute of Technology.

Marquette Superintendent

HENRY LOUIS RESTARICK has been named superintendent of the Superior, Ohio, plant of Marquette Cement Manufacturing Co., Chicago, Ill., succeeding William Moyle, acting superintendent, who has been named project supervisor for the operations department. Mr. Restarick was formerly assistant superintendent of the Silica, Ohio, plant of Medusa Portland Cement Co. Prior to that he was superintendent for the Hawaiian Gas Products Co., Ltd., and for the Hawaiian Cement Co., Ltd., both on Oahu Island, T. H. Born in Honolulu, Mr. Restarick received his schooling there, at the University of Washington, Seattle, Wash., and at the U. S. Naval Academy at Annapolis before returning to the University of Hawaii, where he majored in chemical engineering.

Association President

C. L. WILES, superintendent of production at Steward & Silver, Columbus, Ohio, was elected president of the Columbus Concrete Block Association, Inc., at the recent annual meeting. He succeeds James E. Crissman, partner in Swickard & Crissman. Mr. Wiles has served as vice-president for the past year. Clifford H. Sandusky, general manager of The King-Eichenlaub Co., was elected vice-president and John F. Royer was renamed secretary-treasurer.

I.M.C.C. Managers

H. CLAIR DYER, formerly an assistant sales manager in the phosphate minerals division, International Minerals and Chemical Corp., Chicago, Ill., has been appointed eastern area sales manager for the special products department of the phosphate chemicals division. Bryce L. Rhodes has been named development manager of the division. Mr. Dyer is a graduate of Eureka College, Eureka, Ill., and has also done graduate work at the U.S. Naval Academy. In his new position he will handle sales of triple superphosphate and multiple super-phosphate produced at the Bartow, Fla., plant. Mr. Rhodes holds a B.S. degree in chemical engineering from the University of Minnesota, Minneapolis, Minn., and an M.S. degree from Cornell University, Ithaca, N. Y.

Superintendent of Plants

CHARLES L. HOWLETT has been appointed superintendent of plants, Huron Portland Cement Co., Detroit, Mich. James E. Poole has been named assistant superintendent of vessels, and Charles M. Adams, manager of distribution, has direct supervision of the vessels.

N.L.R.B. Director Joins Lime Firm

V. LEE MCMAHON has resigned as St.Louis regional director of the National Labor Relations Board, Washington, D. C., to join the labor relations department of the Mississippi Lime Co. of Missouri, Alton, Ill., on a part time basis.

Medusa Promotes Marshall

ROBERT A. MARSHALL has been appointed assistant vice-president and assistant general sales manager of Medusa Portland Cement Co., Cleveland, Ohio.

Named Treasurer

CHARLES D. MYERS was recently appointed treasurer of the Duquesne Slag Products Co., Pittsburgh, Penn.

OBITUARIES

ELMER J. HIRSCHFELD, vice-president and treasurer of the Quality Sand and Gravel Co., Wapakoneta, Ohio, died suddenly on March 26. He was 58 years of age. A native of St. Marys township, Mr. Hirschfeld had been in partnership in the sand and gravel firm with his brother, Herbert, for 35 years.

I. S. TILLOTSON, property superintendent at the Mulberry, Fla., phosphate plant of International Minerals and Chemical Corp., Chicago, Ill., died April 7 after a long illness. He was 63 years old. He joined the firm in 1943 as mining superintendent after resigning as city engineer of Lakeland, Fla. Mr. Tillotson received his degree in civil engineering from Rhode Island State College, Kingston, R. I., and was a registered engineer and land surveyor engineer. He was a member of the American Institute of Mining and Metallurgical Engineers and the Florida Engineering Society.

JAMES R. COWAN, chairman of the board of Georgia Marble Co., Tate, Ga., passed away suddenly on April 3 at his home in Marietta, Ga. He was 65 years old. A native of White Plains, N. Y., he attended New York University. He became associated with the Georgia Marble Co. in 1941 as executive vice-president. He was made president of the firm in 1942, and held that position until becoming chairman of the board this year. Mr. Cowan was a member and past director of the National Association of Manufacturers, and had served as vice-president and director of the Associated Industries of Georgia.

OSCAR FRANCIS HENRY, former general manager of the West Virginia Sand and Gravel Co., and the Standard Brick and Supply Co., Charleston, W. Va., died April 14 following a long illness. He was 59 years of age. At the time of his death, Mr. Henry was owner and president of the Oscar F. Henry Co.

JOHN H. CRAIGMIRE, formerly superintendent of the Hannibal, Mo., plant of Marblehead Lime Co., Chicago, Ill., died April 12 after an illness of three weeks. He was 91 years old.

ANTHONY F. STRAZZELLA, superintendent of the Bethlehem Quarry Co., Hanover, Penn., subsidiary of the Bethlehem Steel Co., died April 10. He was 48 years old and had served as superintendent of the Hanover crushed limestone, and fluxstone quarries for 17 years.

R. NEWTON MCDOWELL, president of the Gary Slag Corp., Gary, Ind., died April 14 at the age of 64. Prior to becoming president of the company in 1944, Mr. McDowell operated the McDowell Stone Co., Blackwater, Mo. He moved to Chicago, Ill., in December, 1954.

WILLIAM VANDERWALL, SR., concrete block manufacturer in Spring Lake, Mich., since 1922, died April 1 at the age of 65.

HENRY NELSON ROSE, owner and president of the Industrial Minerals Co., Lancaster, Ohio, died April 13. He was 79 years old.

PAUL A. BARHORST, a partner in the Spring Creek Gravel Co., Fort Loramie, Ohio, died April 14 after a short illness. He was 44 years old.

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Stray Currents from THUNDERSTORMS don't worry me now

I'm using Primacord

"You understand . . . I don't *like* thunderstorms. No blaster does. But ever since that job in Kentucky when a direct hit failed to detonate Primacord, I make it a point to use this detonating fuse during the thunderstorm season."

Here's the reason. Primacord is an insensitive detonating fuse. It is not affected by stray electrical currents. It cannot be set off by friction, sparks or ordinary shock. It must be detonated with a blasting cap.

Primacord is used to detonate the entire load in each hole, and to connect all holes in planned sequence to produce *good digging*. A detonating cap is attached to the Primacord only after everything is ready . . . when men and machines are out of the danger zone.

Use Primacord wherever there is danger of stray electrical currents — and particularly during thunderstorm seasons.

For more information see your Explosives Supplier, or write to

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut
Primacord — Quarrycord — Ignitacord® Safety Fuse — Blasting Accessories
Established 1836

PRIMACORD®

DETONATING FUSE

PROVED AND APPROVED

P-21

To connect a Branch Line of Plastic Reinforced or Plastic Wire Countered Primacord with the Trunk Line

use this DOUBLE HITCH in the textile-covered Primacord Trunk Line. *Draw it up as tight as you can, and make sure that the Branch Line leads off at a RIGHT ANGLE to the Trunk Line.*

Cut the Primacord off the Spool Immediately

Make this a safety habit! As soon as you have taken off the length of Primacord you need for a down-hole or for a trunk-line, *cut it off the spool! Don't waste a second — do it now!*

To connect the Detonator with the Primacord Trunk Line

use FRICTION TAPE. You can detonate Primacord with fuse and cap or electric blasting cap. Lay the cap alongside of the Primacord with the business end of the cap pointing in the direction that the Primacord will detonate. Tape the two snugly together, so that you have a tight connection.

To connect a Branch Line with the Trunk Line

Use this HALF HITCH for Plain and Reinforced Primacord. *Draw it up as tight as you can, and be sure the Branch Line leads off at a RIGHT ANGLE to the Trunk Line.*

To lengthen a Trunk Line

of Plain or Reinforced Primacord, tie a SQUARE KNOT. *Draw it up as tight as you can* — it won't slip back. Caution: don't use any knot in a hole — it might break or hang up explosives when loading.

INDUSTRY NEWS

Cover Picture

ON THIS MONTH'S COVER is an aerial view of the Arizona Sand and Rock Co., operations at Phoenix, Ariz. This recently modernized plant is of reinforced concrete and steel throughout. The sand processing is of particular interest as it includes the use of a sand sizer, a liquid cyclone, four sand spirals, and a rod mill to produce concrete, masons and engine sands. Conveyors and other principal equipment are controlled from a centrally located glass-enclosed station at a high point.

National Gypsum Outlook

NATIONAL GYPSUM CO., Buffalo, N. Y., expects sales for the second quarter of 1955 to exceed the first quarter record of $33,572,033, according to Melvin H. Baker, chairman of the board. The additional production capacities, available beginning with the second half of 1955, provided by the new gypsum plant at Shoals, Ind., and the addition to its Baltimore, Md., gypsum plant, appear to have been absorbed by the backlog of unfilled orders, according to Mr. Baker. The New York gypsum plant was also expanded recently. Development of the firm's gypsum quarry operations at Halifax, Nova Scotia, will provide gypsum for its four Atlantic seaboard plants at an expected saving of $500,000 for the last half of 1955.

Continuation of present levels of production are anticipated by Mr. Baker, who deemed the long-term outlook for the housing industry as "bright." "A study in the trend of population growth and the present outlook for the national economy," he said, "indicate favorable prospects for the company during the next several years."

Open Nepheline Syenite Plant

INTERNATIONAL MINERALS AND CHEMICAL CORP., Chicago, Ill., is building a nepheline syenite plant, costing approximately $1,500,000, at Blue Mountain near Havelock, Ontario. The company will work a deposit of about 30,000,000 tons of the high alumina, high alkali mineral which is used by glass and ceramic industries in the United States and Canada. The plant, when completed late in 1955, will be operated by the Consolidated Feldspar Department of the Industrial Minerals Division.

Safety Awards

THE STANDARD LIME AND STONE CO., Koxville, Tenn., lime plant was awarded a Certificate of Achievement in Safety by the National Lime Association. The plant has operated 1592 days without a lost time injury. Ash Grove Lime and Portland Cement Co., Springfield, Mo., plant, and the Luckey, Ohio, plant of National Gypsum Co., also received awards, for 1683 and 1537 days, respectively, without a disabling injury. The Thousand Day Safety Club for the lime industry is open to all lime plants enrolled in the industry-wide safety competition sponsored annually by the N.L.A.

Canadian Steel-Cement Project Involves $100,000,000

A GROUP OF BRITISH AND EUROPEAN COMPANIES are planning to establish a steel and cement industry in British Columbia, Canada, at an eventual cost of $100,000,000, as announced by Dr. William K. Waller who represents the group. The first stage of the project will be to build a steel smelter on the Canadian Pacific Coast, costing approximately $10,000,000, with an annual capacity of 50,000 tons, and a cement plant at Chilliwack, B. C., costing about $7,000,000. The cement project will be handled by Anglo-Canadian Cement Distributing Co., Ltd., of Vancouver.

Abandons Cement Merger Plans

SUPERIOR PORTLAND CEMENT, INC., Seattle, Wash., has abandoned its proposed merger with Ideal Cement Co., Denver, Colo., after failure to obtain clearance from the Antitrust Division of the Department of Justice.

Start Crushed Stone Plant

ANDERSON-OXANDALE CO. recently began operations at a crushed stone plant at Pryor, Okla., with a capacity of 1200 tons daily. The company produces crushed limestone for concrete and bituminous road work, and also supplies chip rock. Clayton Strome, superintendent of the firm's plant at Independence, Kan., is in charge of operations at Pryor.

Glens Falls Increasing Capacity of Cement Plant

GLENS FALLS PORTLAND CEMENT CO., Glens Falls, N. Y., is installing major manufacturing equipment at its cement plant, to increase operating efficiency. Such projects as the St. Lawrence Seaway, the Connecticut Expressway and the Portsmouth, N. H., Air Base will provide a high demand for cement during coming years, and the Glens Falls plant will operate at maximum capacity.

Medusa Cement Expands

MEDUSA PORTLAND CEMENT CO., Cleveland, Ohio, has announced plans for expansion of its Dixon, Ill., cement plant, increasing its present capacity of 1,000,000 bbl. of cement to 2,500,000 bbl. of cement annually. The expansion, costing approximately $8,000,000, is expected to be completed by the end of 1956. Improvements will include installation of modern dust collection equipment. E. C. Carlson will continue as superintendent of the plant, with N. E. Smith as assistant superintendent.

Opens Limestone Quarry

LYNCHBURG STONE DIVISION of Rockydale Stone Service Corp., Roanoke, Va., will begin operations this summer at a 400-acre limestone quarry property near Lynchburg, Va. The deposit is estimated to have from 3 to 6 million tons of limestone, and an annual production of 200,000 tons is anticipated. Gordon Willis is president of the firm, and Keith Willis, secretary-treasurer, is in charge of production at the Lynchburg quarry.

State Cement Fund Transfer

THE SOUTH DAKOTA CEMENT COMMISSION recently transferred $750,000 to the state's general fund from the South Dakota Cement Plant fund at Rapid City, S. D. Last year, $500,000 was transferred to the general fund, making a total of $1,250,000 transferred from the plant fund in less than a year. Governor Joe Foss commended the Cement Plant Commission for its efficient operations.

Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 20,231,000 bbl. of finished cement in January, 1955, and produced 17,612,000 bbl. in February, 1955, as reported by the Bureau of Mines. The January figure was an increase of 14 percent over the January, 1954, figure, and in February, 1955, production was 4 percent above the February, 1954, figure. Mill shipments totaled 13,314,000 bbl. in January, 1955, 19 percent more than in the same month of the previous year. In February, 1955, mill shipments totaled 13,806,000 bbl., 9 percent less than in February, 1954. Stocks in January were 9 percent less than on the same date a year ago, and in February, stocks were 2 percent less than those on hand a year previous. Clinker production during January, 1955, totaled 22,943,000 bbl., an increase of 10 percent from the January, 1954, figure. In February, 1955, clinker production totaled 20,767,000 bbl., an increase of 10 percent over the February, 1954, figure. The output of finished cement during January, 1955, came from 157 plants located in 37 states and Puerto Rico, and in February, 1955, came from 156 plants in 37 states and Puerto Rico. During January of 1954, 20,231,000 bbl. of finished portland cement were produced. In February of 1954, 17,612,000 bbl. of finished portland cement were produced.

Mica Mining and Finishing

DIXIE MINES, INC., a recently incorporated firm, is building a mica grading and drying plant at Heflin, Ala., at an approximate cost of $125,000. Scrap mica will be washed and separated at a separation plant near Micaville, Ala., before being brought to the new plant. Two lakes will be built to provide adequate water and to act as a settling basin for the scrap mica. The company owns about 800 acres of mica mining property in Cleburne and Randolph counties, and will also purchase mica from private landowners. Permanent offices are being established at the new plant site. Officers of the firm are: Dr. John Longley, president; G. P. Gout, vice-president; Ray Rendelman, secretary; and Edward J. Smith, treasurer.

Builds Gypsum Plant

KAISER GYPSUM CO., Oakland, Calif., is building a gypsum board and plaster plant at Pittsburg, Calif., near San Francisco, at a cost of approximately $5,000,000. The plant site is a 72-acre tract with an 800-ft. frontage on the Sacramento River where a dock will be built adjacent to a turning basin for self-discharging ocean going ore ships serving the plant. The plant will include six main buildings and auxiliary structures, and is expected to have an annual production capacity of 180,000,000 sq. ft. of gypsum board products and 20,000 tons of plaster. The plant is scheduled for completion by August, 1956, and raw gypsum ore will be shipped to the plant from quarries on San Marco Island in Lower California. The company, a wholly-owned subsidiary of Permanente Cement Co., operates three plants, at Redwood City, Long Beach, Calif., and at Seattle, Wash.

Adds Eleven Barges

NEW YORK TRAP ROCK CORP., New York, N. Y., is adding 11 steel barges to its fleet, increasing it to over 200 barges, of which over 190 are wooden. Three of the 11 were recently delivered to the company's Haverstraw, N. Y., plant, two of which have 1200-ton capacity and the third, a 700-ton capacity covered barge for shipment of pulverized limestone from the Verplanck, N. Y., plant.

The 700-ton covered barge was christened the George F. Kelleher, after a 40-year employe of the company. One of the 1200-ton barges was named the Innis O'Rourke, after a company director, and the third barge was christened the Robert DeVecchi, also a director.

The 11 steel barges will cost over $500,000, and will bring the cost of the company's 18-month barge building program to $2,000,000. The steel barges, of which the firm operates five, were constructed by the Richmond Steel Co., Richmond, Va.

Buys Steel Division

KAISER STEEL CORP., Oakland, Calif., has announced plans to purchase the steel division of Basalt Rock Co., Inc., consisting of two steel-pipe plants at Napa and Fontana, Calif. The Napa plant is located on a 75-acre tract of land, and the plant at Fontana is on a 35-acre site adjacent to Kaiser Steel's plant.

To Double Capacity

KENTUCKY LIGHT AGGREGATES, INC. is installing an 8- x 125-ft. kiln at its lightweight expanded-shale aggregate plant near Shepherdsville, Ky., at a cost of approximately $200,000. The kiln will double plant capacity, and is the second of four kilns which the company eventually plans to install.

Silica Firm Sales Increase

INDUSTRIAL SILICA CORP., Youngstown, Ohio, has noted a marked improvement in sales and profit during the first quarter of 1955, with March and April sales exceeding sales during those months in 1954 and 1953, according to a report by P. G. Forman, president. Net income in 1954 had dropped 26.68 percent to $60,053 from the 1953 figure of $146,213. Additions and improvements during 1954, including improved drying facilities at the Coxey plant at Dundee, Ohio, cost approximately $30,000.

Fourth Try to Establish Cement Plant

THE UNITED STATES CEMENT CORP. is considering Cabazon, Calif., as a possible site for its proposed cement plant. Previously, the corporation had applied for zoning permits at Palm Springs, Hemet and Perris, Calif., only to be turned down. The firm withdrew its application to build the plant at Perris, following protests by the Air Force, that smoke and dust from the plant would make landings at the nearby March Air Force Base more hazardous. No definite site for a plant has been considered at Cabazon, but a survey conducted by the cement company revealed that there are no major obstacles of a technical nature in the area. Cement plant officials believe the city is far enough from Palm Springs to avoid opposition from the resort city, and pointed out that in a vote on the proposal held some years ago, the people in the area favored a cement plant for the county. If Cabazon is chosen for the site, limestone would be conveyed from a quarry located in the San Jacinto Mountains.

U.S. Gypsum Plant

UNITED STATES GYPSUM CO., Chicago, Ill., is building a plant on the Houston Ship Channel, Houston, Texas, which will process a special paper to be used in the manufacture of Sheetrock gypsum wallboard and Rocklath plaster base. The plant is the fifth in the company's chain of paper mills, which are located in Kansas City, Mo.; Southgate, Calif.; upstate New York; and in Ohio. The plant is being built as part of a $40,000,000 expansion program, and will serve the company's gypsum plants at Sweetwater, Texas; Southard, Okla.; Jacksonville, Fla.; Norfolk, Va.; and New Orleans, La. The plant is expected to be completed and in operation in 1956.

Operating at Full Capacity

PRESQUE ISLE CORP. is operating at full capacity at its recently established high calcium metallurgical limestone plant near Alpena, Mich. The plant is operated by the Kelley Island Co., Cleveland, Ohio, and operates steamers John A. King, United States Gypsum and the Peter Reise. N. D. Shafer, general manager, announced that approximately 4,500,000 tons of metal-

lurgical limestone will be shipped this year to steel mills in Cleveland, Ohio, Chicago, Ill., Buffalo, N. Y., and Detroit, Mich.

Pass A.C.P. by Large Majority

THE UNITED STATES DEPARTMENT OF AGRICULTURE'S Appropriation Bill was passed by the Senate, appropriating the department's funds for 1955, and authorizing the 1956 Agricultural Conservation Program. Secretary Benson had asked the House for $175 million for the 1956 A.C.P., and the House gave him $250 million. The National Agricultural Limestone Institute countered with a request for at least $300 million, but the Senate Subcommittee, under Senator Russell of Georgia then reported the bill out with $250 million. Senator Williams of Delaware, an advocate of reducing A.C.P., offered an amendment to substitute $195 million for the $250 million in the Committee bill, but the vote was 76 to 5 in support of the $250 million figure. The only senators voting against the $250 million were Williams and Frear of Delaware, Payne of Maine, Bush of Connecticut and Curtis of Nebraska. The 76 to 5 vote is quite a change from two years ago, when it passed by one vote.

South African Phosphate

PHOSPHATE DEVELOPMENT CORP. is developing phosphate mines in South Africa, which may soon make the country independent of outside sources, according to a report in *Chemical and Engineering News*. The corporation has started open cast mining of apatite from which the phosphate concentrates are extracted. It has been estimated that the apatite deposit is sufficient to supply domestic needs in South Africa for about 150 years. The firm plans to produce super-phosphate fertilizers for the country's growing agricultural program.

Buys Lightweight Aggregate Plant

TEXAS INDUSTRIES, INC., Dallas, Texas, has purchased Mineral Products Co., Kansas City, Kan. The newly acquired company produces lightweight expanded clay aggregate by the sintering process, and markets it under the trade name, "Lite-Wate."

Moves Offices

STEWART SAND AND MATERIAL CO., Kansas City, Kan., purchased buildings formerly occupied by the Midwest Research Institute. The company is moving its offices from the Grand Avenue bank building, to the recently purchased buildings, following remodeling which is expected to be completed in July.

Riverside Cement Outlook

RIVERSIDE CEMENT CO., San Francisco, Calif., expects its profits to continue at the $3.6 million profit rate reported for 1954, according to Garner A. Beckett, president. Construction activity in Southern California is expected to continue at last year's level, and due to a 25 percent increase in cement production, Mr. Beckett anticipates a cement surplus in 1955, rather than the shortage which existed in 1954.

Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of April were listed by the Portland Cement Association as follows:

	Sq. yd. awarded during April, 1955
Roads	2,278,729
Streets and alleys	3,336,125
Airports	2,855,290
Total	8,470,142

Japanese Cement Production

THE JAPANESE CEMENT INDUSTRY plans to increase its exports by about 30 percent to 1,200,000 metric tons in 1955, cultivating new overseas markets. Cement production in Japan is expected to total 11,400,000 tons in 1955, compared with 10,640,219 tons in 1954. It is anticipated that production capacity will be expanded to 15,000,000 tons annually by the end of March, 1956.

Expands Cement Plant

BESSEMER LIMESTONE AND CEMENT CO., is expanding its cement plant at Bessemer, Penn., at a cost of about $3,600,000. A rotary kiln, 450 ft. long and 12 ft. in dia., is being installed along with auxiliary equipment. Also included are additional raw grinding facilities and increased finished cement storage capacity. The expansion program is expected to be completed by Spring, 1956. Frank B. Warren is president of the company, and H. E. Reed is vice-president in charge of operations.

Build Gravel Washing Plant

CARROL, LEON AND GENE GLOVER have started operations at a gravel-washing plant at Star City, Ark., at a cost of approximately $30,000. The plant has a capacity of about 60 cu. yd. per hr., and produces three grades of material; washed rock, pea gravel and sand.

Expands Gypsum Plant

COLUMBIA GYPSUM CO., LTD., Greenacres, Wash., has installed new mixing equipment at its plant, increasing capacity from 150 to 300 tons of gypsum daily. The plant produces agricultural gypsum, and mixes active fertilizer with gypsum. A borated gypsum product is also produced.

Buys Gravel Plant

DOUGLAS E. BUCKLEY has purchased the Yost brothers' gravel pit at Mora, Minn., producing washed sand, gravel and crushed stone.

Scottish Silicone Plant

THE ICI SILICONE PLANT at Ardeer, Scotland, has announced plans to produce silicone fluids, resins, rubbers and various other silicone products which are presently being imported.

Leases Diatomite Land

WUNDER EARTH, INC., a recently formed corporation, has leased diatomite deposits near Harper, Ore., in Malheur County.

Coming Conventions

June 26-July 1, 1955—
American Society for Testing Materials, 58th Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

August 8-10, 1955—
National Cinder Concrete Products Association, Summer Meeting, Hotel Chalfonte - Haddon Hall, Atlantic City, N. J.

September 19-24, 1955—
National Industrial Sand Association, Fall Meeting, The Greenbrier, White Sulphur Springs, W. Va.

January 23-25, 1956—
National Concrete Masonry Association, 36th Annual Convention, Roosevelt Hotel, New Orleans, La.

February 20-22, 1956—
National Crushed Stone Association, 39th Annual Convention and Exposition, Conrad Hilton Hotel, Chicago, Ill.

HINTS AND HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Tire Takes Drop Ball Shock

A WESTERN STONE PLANT uses a discarded rubber truck tire to take up some of the shock to the crane when

Rubber tired shock absorber for drop ball operations

a drop ball is lifted. The drop ball shown in the illustration weighs 3800 lb. This idea is now being used in several quarries to reduce strain on crane booms.

Gasoline Engine Drives

A WESTERN SAND PRODUCER uses gasoline engines for practically all of the operating units in the plant. The belt conveyor handling masons sand uses an Allis-Chalmers gasoline engine mounted near the toe of the 40 ft. long conveyor. A long shaft and a universal joint connects the engine with the head pulley, the long shaft being supported by inverted U-shaped pipe frames and bearings over the belt.

Portable Stockpiler

A PORTABLE STOCKPILING UNIT was described in ROCK PRODUCTS, July, 1954, page 94. As additional information has been requested on the system, the details are given below.

As shown in the illustration, the hopper holds 50 tons. After being loaded at the plant, it moves by gravity over the rails to the stockpiling area. A 12-ton Vulcan locomotive returns the stockpiler when it is empty. In transit, in either direction, the boom conveyor is parallel to the track. A 24-in. belt is used. Under the hopper is a short belt conveyor feeder driven by a small

Stockpiling boom conveyor is fed from 50-ton hopper

electric motor. The boom conveyor is swung into the desired position by a Caterpillar diesel-electric unit which drives the narrow drum over which the wire rope operates.

After the hopper is loaded and it moves by gravity to the unloading site, small stiff-leg supporting braces are locked into position on the inside or side nearest the stockpile. Then the boom conveyor is swung into position. The stiff-leg braces compensate for the weight of the over-hanging boom conveyor. It can unload to either side

Close-up of the belt feeder, under 50-ton hopper, and drum of swinging boom conveyor

of the track so that a large number of separate stockpiles can be built by the system. Two men stockpile 150 t.p.h.

Sand Blending Over Conveyor

AT A WESTERN SAND AND GRAVEL PLANT four 10-in. modified Krebs liquid cyclones recover sand in the minus 200, plus 300-mesh range. This compact cyclone is essentially a two-stage unit. The first stage produces an overflow (slimes) that can be wasted, and an underflow of fine sand that immediately enters the second stage or cone for additional attrition and separation. At this second stage there is a second overflow of slime and the finished fine sand is produced.

Tests at this plant indicate that 97 percent of the plus 275 mesh sand was recovered. The feed to the cyclones is the overflow from a water scalper of generous surface area, plus the overflow from a 48-in. Wemco sand preparation machine which is practically all minus 100 mesh. The cyclones operate under 20 p.s.i. and produce 15 to 18 t.p.h. The finished sand discharge from the second stage of the

Gasoline engine drives belt conveyor through universal joint and long shaft

At end of belt conveyor may be seen pipe which discharges fine sand pumped from liquid cyclone

Krebs cyclones is held at around 70 percent solids, and is picked up by a pump and delivered to the end of the belt conveyor that handles the coarser sand from the plant. At that point, the fine sand falls into the main cone of the sand pile where it is continuously blended.

Flexible Tube for Loading Lime

AT A WESTERN LIME PLANT, coarse lime is loaded into closed hopper railroad freight cars by means of flexible

Telescoping sleeves load lime into closed hopper cars

tubes that are made up of short telescoping sleeves. This arrangement permits flexibility and holds down dispersion of dust to a minimum.

Tough Digging

AT A SAND AND GRAVEL OPERATION in the northwest, a crescent scraper bucket is used to dig gravel, some of which is under water, that includes fairly large boulders that weigh a ton or more. Boulders in the 2 to 5-ft. diameter range are quite common. In addition there is a layer of hard pan below water level. When cutting through hard pan, a smaller crescent is used.

The illustration shows the 5-cu. yd. crescent scraper unit which is normally used. It has been reinforced with the division plates that give added strength to the unit. A 350-hp. Sauer-

Reinforced scraper bucket which can take impact of boulders and hard pan digging

man variable speed hoist, equipped with air brakes and having a pull-in speed up to 550 f.p.m. and a back haul of up to 1500 f.p.m., is used at the plant.

Cleaning Mixer Trucks

WHITESTONE READY-MIX & MATERIALS CORP., Whitestone, N. Y., has adopted the portable cleaning equipment shown in the illustration to keep its mixer trucks looking bright and clean with a minimum time and effort. The equipment includes a Model 250 high pressure steam combination cleaner made by Malsbary Manufacturing Co., Oakland, Calif.

The steam cleaner produces pressures up to 300 p.s.i., and delivers nearly a third more cleaning solution than the previous set-up through the ¾-in. I.D. coils. This model uses a pump for pressure instead of steam as a source of power.

Two valves on the control panel enable the operator to shift instantly to any of five cleaning actions. These five cleaning actions are as follows: (1) high pressure steam maintained at 325 deg. F., with 240 gal. per hr., and up to 300 p.s.i.; (2) high pressure cold water to 350 gal. per hr., at 300 p.s.i.; (3) high pressure hot water at the rate of 360 gal. per hr., at 300 p.s.i. and up to 212 deg. F. at the cleaning nozzle; (4) low pressure wet steam at 15 b.hp.; and (5) low pressure warm water at the rate of 360 gal. per hr. with temperature thermostatically controlled.

Feeder Drive

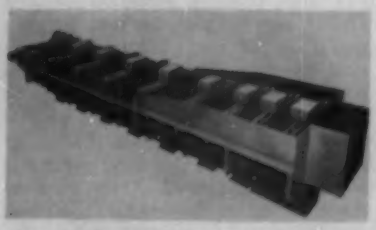
PORTABLE CRUSHING PLANTS have used many ingenious drives to save on power requirements. In the accompanying illustration may be seen a roller chain off-take drive to an apron

Apron feeder for crusher driven by roller chain drive from crusher flywheel

feeder from the flywheel of a 24- x 36-in. Cedarapids jaw crusher. The apron is supported on a concrete pier and base for stability. The jaw crusher and electric motor which drives it are each supported on individual concrete piers for rigidity.

Cleaning mixer trucks with high pressure steam

NEW MACHINERY



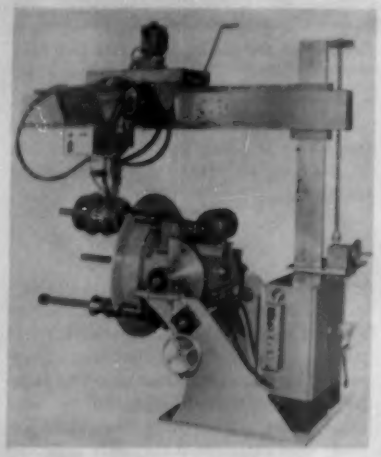
Power-Operated Bleeder Valve Controls Sand Depth

EAGLE IRON WORKS, 137 Holcomb Ave., Des Moines, Iowa, has developed a positive acting electric-hydraulic power-operated bleeder valve to control proper depth of settled sand in its water scalping tanks used in conjunction with its fine material screw type washer-classifier-dehydrators. The "snap-action" of the bleeder valve provides quick opening and closing, avoiding bleeding of only water, and thus eliminates excessive amounts of water from being delivered to the settling pool.

The sand-laden water enters through a feed box with velocity killer, the water flowing to the far end of the tank to an adjustable overflow weir. The sand settles, and there is a revolving shaft with paddles at the bottom, above each valve. When settled sand builds up to the desired level so as to restrict the paddles from turning, the electric - hydraulic mechanism snaps open the particular valve involved. The sand bleeds off until the paddles are free to turn again, and then the valve snaps closed.

Double Diesel Crawler Tractor

EUCLID DIVISION, General Motors Corp., Cleveland, Ohio, has brought out the TC-12 Twin-Power crawler tractor, featuring the use of two 194-hp. Series 6-71 General Motors diesels. Each diesel drives one of the tracks through separate Allison Torqmatic drives consisting of a torque converter and a semi-automatic transmission. There is no master clutch; changing from one speed range to another is done under full power. Three speed ranges, forward and reverse, provide speeds to 1.5 m.p.h. in low range, 3.0 m.p.h. in intermediate, and 8.3 m.p.h. in high. The radiators are located in the rear of the tractor, each having 28-gal. capacity. Track gauge is 110 in., overall width is 136 in. and overall length is 194 in. Drawbar height is 23 in. and ground clearance is 20 in. Drawbar pull with bulldozer attachment is 69,750 lb., depending on total tractor and equipment weight.



Roller and Idler Rebuilder

C. B. HERRICK MANUFACTURING CORP., 2000 Center St., Cleveland, Ohio, has developed Model CB 4 RI, an automatic roller and idler rebuilder, of heavy welded steel construction. It consists of a base, tilting and rotating work table, vertical column and lateral travel carriage beam. The work table has a capacity of 500 lb., and by using a tail stock or outboard bearing, a 1000-lb. load may be rotated when the table is tilted at 90 deg. A manual tilt of 135 deg. is provided.

A vertical adjustment of the beam has a working range of 42 in. The travel carriage may be used to manually position the welding head over the work to be welded, or to provide automatic variable speed movement laterally. A heavy spindle in the center of the table holds the idler.

For welding rollers, four spindles are provided, equally spaced on the outer edge of the turntable. As the work table turns, a spindle is engaged at each 90 deg., and is driven by a variable speed control independent of the table drive unit. This permits cooling of the rollers between weld passes. Automatic indexing is supplied to move the welding carriage forward the desired distance after each roller revolution. Electrical controls are located beside the welding head. The rebuilder is 100 in. high, 54 in. wide, and 72 in. deep.

Industrial Truck Series

DODGE DIVISION, CHRYSLER CORP., Detroit 37, Mich., has announced the C-3 Series of Dodge Job-Rated trucks, available with a choice of 12 engines, either 6-cylinder of Power-Dome V-8 engines ranging from 103 to 202 hp. Maximum gross vehicle weight ratings of the trucks range from 4250 to 40,000 lb., while gross combination weights range up to 60,000 lb. The trucks feature increased power, new styling, cabs with wrap-around windshields and rear windows, increased glass area, automatic transmission, and the expansion of power steering and power brakes into additional models.

Rotary Compressor

WORTHINGTON CORP., Harrison, N. J., has added a portable rotary compressor to its line of "Blue Brute" reciprocating type compressors and air tools. The compressor features a hydraulically operated clutch with a patented interlocking control valve, which

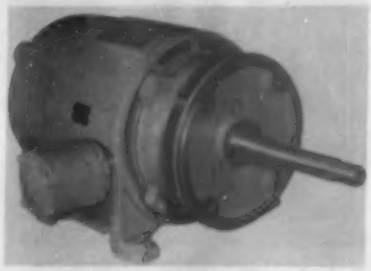
permits the engine to warm the compressor oil and lubricate the moving parts when the clutch is engaged. A cylinder arrangement with full gravity-draining of oil during shut-down, prevents liquid from settling in cylinders, interstage chamber, or discharge point. Other features include a low-set fuel tank; separate oil reservoir tank and air receiver; two-stage oil separation with vortex in oil tank and final filter in air receiver. The rotary compressor is available in 315-cu. ft. capacity.

Oxygen Analyzer

ARNOLD O. BECKMAN, INC., 1020 Mission St., South Pasadena, Calif., has added the Model C2P oxygen analyzer to its line, for measuring continuously-flowing samples, or for fixed volumes as small as 3 cc. The instrument is available for ranges of 5 percent or more between 0 and 75 percent oxygen, and in ranges of 15 percent or more between 75 and 100 percent oxygen. Accuracies are said to be within plus or minus 1 percent of full scale. It is insulated against shock and vibration, and the analysis unit in contact with the gas is made of corrosion-resistant material. A special coating provides protection against such highly corrosive gases as SO_2, SO_3, H_2S, etc. The scale is direct reading, and may be calibrated in either percent oxygen or millimeters of mercury oxygen partial pressure.

Tractor-Shovels

THE FRANK G. HOUGH CO., Libertyville, Ill., has introduced two four-wheel-drive models to its line of "Payloader" tractor-shovels, designated Model HU, with 1-cu. yd. heaped capacity, and the Model HH, with 1½-cu. yd. heaped capacity. The tractor-shovel design is said to permit 40 deg. bucket "breakout" at ground level, rather than at a 3 or 4-ft. "carry" position. A "pry-out" action is provided by using breakout pads on the ground as a fulcrum for leverage, thus transferring opposing load forces to the ground through the pads during breakout, rather than to the axle, wheels and hydraulic system. Other features include: sealed pressurized hydraulic systems; 12-volt battery systems on the gas-powered units with battery box and hydraulic oil reservoir mounted behind the driver's seat. Torque converters and full-reversing transmissions; double-acting hydraulic rams with chrome-plated piston rods; hydraulic brakes and power steering are standard on both models, and load-shock accumulator devices are optional.



Close-Coupled Pump Motor

U. S. ELECTRICAL MOTORS, INC., Box 2058, Terminal Annex, Los Angeles 54, Calif., has developed a line of totally-enclosed, explosion-proof, close-coupled pump motors. Designed for use with centrifugal pumps operating in damp or dusty locations, the motors are available in horsepowers ranging from 1½ to 25 hp. The motors feature asbestos-protected windings, normalized castings, Lubriflush bearing lubrication and a solid cast rotor. The larger models are double-enclosed and fan-ventilated for heat dissipation, while the smaller models are self-cooled by radiation. The explosion-proof models are fitted with a specially sealed conduit box, elongated bearing sleeves, sparkproof aluminum fan and long bracket registers.

Castable Refractory

J. H. FRANCE REFRACTORIES CO., Snow Shoe, Penn., has announced an extra strength castable, designated Hydrecon 186, Extra Strength, for industrial application where higher compressive strength is required than that of standard 2450F refractory castables. At 2000F, the product is claimed to develop more than twice the strength of a standard castable. It is also designed for application in the cold zone of rotary cement kilns.

Worm Gear Reducer

PHILADELPHIA GEAR WORKS, Erie, Ave. and G St., Philadelphia 34, Penn., has announced the "Steeple" type worm gear reducer for long, unsupported vertical output shaft extensions. The "Steeple" feature can be mounted on existing standard types of Philadelphia vertical worm gear units without major modifications to the basic gear unit. The wide bearing span is designed for rigidity to the extended shaft, and the "dry well" construction eliminates the need for a stuffing box on the vertical shaft. An automatic reversing oil pump, together with a filter, is incorporated in the unit housing to insure positive lubrication of the upper bearing on the vertical shaft.

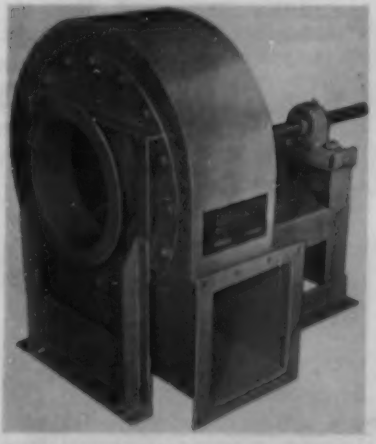
Scrapers

THE WOOLDRIDGE MANUFACTURING DIVISION, Continental Copper Steel Industries, Inc., Sunnyvale, Calif., and the M-R-S Manufacturing Co. of Flora, Miss., have jointly announced a line of four-wheel cable operated scrapers designed for use with M-R-S tractors. Special "traction masts" are incorporated for use with the tractor's hydraulic weight transfer system, which shifts weight forward to the tractor drive wheels when extra trac-

tion is needed. The scrapers are of open-bowl design, and feature stabilized balance with extra low center of gravity, "boiling bowl" loading, large low pressure tires for greater flotation, and full-power-forward positive pivot-tilt ejection. The scrapers are designated as Wooldridge M-R-S OS-80, OS-90, OS-152, OS-200, and OS-260, with heaped capacities ranging from 10.5 to 32.5 cu. yd.

High Capacity Feeder

OMEGA MACHINE CO., 345 Harris Ave., Providence, R. I., has announced a high capacity belt gravimetric feeder with a Sens-A-Gram controlling device. The feeder, designated "Hi-Weigh—Model 37," continuously weighs and feeds dry materials at a rate of over 3000 lb. per min. with accuracies of plus or minus 1 percent by weight within range. The feeder features a 100 to 1 variable speed transmission, and it has a heavy-duty belt with a positive chain drive to eliminate slippage.



Industrial Fans

DRACCO CORP., Harvard Ave. at East 116th St., Cleveland 5, Ohio, has announced industrial fans which may be utilized to move a variety of substances, including clean or dirty air, fumes, dust, refuse, shavings, or stringy material. Specialized fans are available for conveying explosives, gases up to 800 deg. F., or materials of a corrosive nature. The fans may be had with inlet diameters from 11 to 38 in., pressures to 17 in. S. P., and in capacities from 500 to 46,000 c.f.m. Of heavy gauge welded steel construction, the units have extra reinforcement to reduce vibration in the large fans, and long shaving type wheels of rugged steel construction, shrouded in the larger sizes. Included among its features are: removal of the wheel from the housing for cleaning and maintenance; static and dynamic balancing of the wheel; and heavy-duty, self-aligning pillow block bearings to permit the unit to be placed on a side wall or ceiling.

Tubeless Tire Rim

GOODYEAR TIRE AND RUBBER CO., Akron, Ohio, has developed an air-locking rim, designated "Tru-Seal," for use with tubeless truck tires from ¾-ton trucks to giant earthmovers, and also present cast wheel equipment. It consists of a three-piece rim with a small rubber ring clamped into position by the lock ring. In mounting, the valve is fastened in the rim, and tubes and flaps are eliminated. The rim also includes the full flange height and support always given truck tires. The tubeless tire for the rim is the same as the conventional truck tires except for a slight change in bead base shape. For passenger car and small truck tires, a drop-center rim is featured to which the tire beads make a firm air seal. A modification of the drop-center combination can be extended to larger truck tire sizes by the use of a shorter section tire.

Welding Electrode

STULZ-SICKLES CO., 134 Lafayette St., Newark 5, N. J., has announced a manganese-nickel steel welding electrode, featuring a "Flo-Kote" coating with the alloys in the wire, not in the coating. It is designed to weld vertically or overhead, as well as downhand. The electrodes will weld manganese steel to manganese steel, or manganese and mild or high-carbon steels. The welds may be cut with an acetylene torch when necessary.

3-D Sequence Camera

ATLAS POWDER CO., Wilmington, Del., has introduced a 3-D, sequence camera specially designed to study the action of explosives at work on typical applications. The camera shoots four synchronized stereo-pairs a second, enabling the viewer to see the separate blast phases in three dimensions, and aids in tracing, both in direction and distance, the movement of the burden. The stereoscopic camera assembly consists of three units, the camera, synchronizer, and power supply. A remote triggering cable allows the camera to be operated from distances up to 250 ft.

Diesel Crawler Tractor

ALLIS-CHALMERS MANUFACTURING CO., Milwaukee, Wis., has announced the 31,500-lb. HD-16 diesel crawler tractor. The six-cylinder, 844-cu. in.

diesel engine develops 150 net hp. at 1800 r.p.m. with torque converter, and 140 net hp. at 1600 r.p.m. with standard transmission. Features include an all-steel, box-type "A" main frame; one-piece, line-bored steering clutches and final drive housing for long gear life; straddle-mounted, double-reduction final drive gears mounted on tapered roller bearings; and roller bearing truck wheels with 1000-hr. lubrication. Standard equipment includes steering controls; "Wrap-Around" radiator guard; 20-in., heat-treated track shoes; positive seal heavy-duty truck wheels, heavy-duty front idlers and support rollers; electric rollers; electric starting and lighting equipment; pusher type fan; etc. A line of matched equipment such as dozers, shovels, scrapers, power control units, and sideboom is designed for the HD-16.

Plastic Safety Helmet

MINE SAFETY APPLIANCES CO., Pittsburgh, Penn., has announced a Skullgard plastic safety helmet designed to provide extra protection in the "danger zone," the front, top, and back areas of a hat that working positions expose most often to impact. The helmet incorporates special reinforcement in the three vital areas, without increasing the weight. It is high-pressure molded in one piece from hard, smooth, laminated plastic, and the rounded contours and strength of the helmet are said to provide effective deflection of falling or flying objects, as well as against bump-hazards when working in close quarters.

Conveyor Belt Repair

FLEXIBLE STEEL LACING CO., 4607 Lexington St., Chicago 44, Ill., has announced REMA, a self-vulcanizing rubber repair material for repairing conveyor belts and rubber covered electrical cables. The abrasive-resistant cover stock and rubber filler self-vulcanize by a chemical process, and no heat or heavy equipment is necessary. The belt may be put back into operation immediately after repairs.

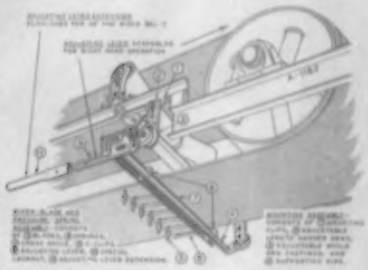
Drill Bits

BRUNNER & LAY, INC., 9300 King St., Franklin Park, Ill., has brought out X-type, tungsten-carbide Rok-Bits, designed for use on large drilling machines. The bits are made to fit directly on the steel of two machines, eliminating the need for adapters. The bits are available in 3½, 4 and 4½-in. gauge sizes, to fit on 1½ and 2-in. drill rods.

Portable Crushing Plant

IOWA MANUFACTURING CO., Cedar Rapids, Iowa, has announced a Cedarapids portable crushing plant, the "Corporal," for producing crushed gravel or stone where the finished product does not have to be graded. The plant consists of a welded steel hopper designed for heavy feeding, a 14- x 24-in. roller bearing jaw crusher, on 18-in. x 23-ft. 3-in. delivery conveyor, and a choice of power units, all mounted on a heavy-duty gooseneck full-trailer with a 10-in. truck frame. Hopper loading height of 7 ft. 8 in. permits feeding with a power shovel.

The jaw crusher is the overhead eccentric type with a fully stress-relieved welded steel base. A safety toggle plate is incorporated to provide protection against tramp iron or other uncrushable material. Under proper operating conditions, the unit produces 15 to 27 tons of 1½-in. material with 95 percent crushing. Gasoline, diesel or electric power units are available with a rating of 40 hp. at 1800 r.p.m. Optional equipment includes 10:00 x 20, 12-ply pneumatic tires, air brakes on the rear wheels, an engine service platform, and two screw type jack supports.



Conveyor Belt Cleaner

STEPHENS-ADAMSON MANUFACTURING CO., Aurora, Ill., has introduced the S-A spring type conveyor belt cleaner, designed to remove material adhering to the belt after discharge. Steel wiper blades perpendicular to the belt surface, and diagonal to its line of travel, scrape off material, allowing it to fall to the discharge chute. Pressure against the belt can be adjusted for different operating conditions, as the wiper blades are mounted on spring arms. The design incorporates a twist in the arm so that a vertical edge is exposed to the dribble falling from the wiper blades, thus eliminating build-up on the arms. The unit has adjustable mounting brackets to fit belt conveyor head pulley assemblies.

Truck Tracks

P & G SUPPLY CO., 2262 N. Albina St., Portland 12, Ore., has brought out truck tracks, designed to fit most tires, giving up to 500 percent greater flotation. The tracks may be adjusted to various size tires and road conditions, and are available in standard tracks of 15 in. for single and tandem axles. Heavy-duty 18-in. tracks are also available for larger size tires.

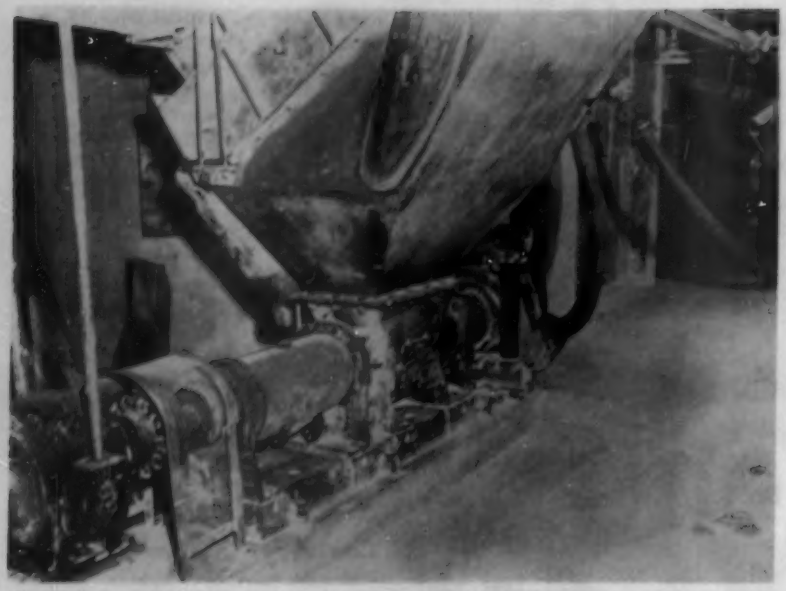


Fig. 1: A 5-in. stationary pump that transports talc from fluid energy mills to storage

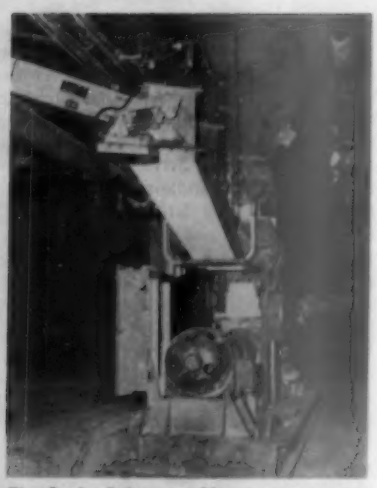


Fig. 2: An 8-in. portable pump, mounted on a track beneath storage silos, is used to empty silos and move finished talc to bagging machines or box car loading. Overhead can be seen Airslide that conveys talc from flatbottomed bins to the 8-in. portable pump

PNEUMATIC SYSTEM
Conveys Ground Talc Throughout Plant

• Gouverneur Talc Co., doubles capacity and expands pneumatic conveying system at plant near Gouverneur, N. Y. to handle increased production of mills

WHEN GOUVERNEUR TALC CO. nearly doubled the capacity of its Balmat, N. Y., talc plant, the problem arose of handling the increased output. The problem was solved economically by easily-made changes and additions to the existing Fuller-Kinyon pneumatic conveying system. The Fuller Co. designed it with the possibility of future expansion in mind.

Gouverneur Talc Co. was organized by the parent company, R. T. Vanderbilt Co. of New York, which specializes in industrial minerals, to exploit a large deposit of talc in upstate New York. The plant, atop the deposit, is situated about eight miles southeast of Gouverneur, N. Y., in the heart of New York's talc mining district. Talc is mined by open-stope methods at 300-ft. and 500-ft. levels. Ore is brought to the surface by skip hoist up an 800-ft. concrete-lined shaft. At the adjacent plant, it is crushed, screened and dried, then ground to the requisite fineness.

When it began operation in 1948, the plant could produce 200 tons per day, but the company has been forced to expand since then to keep pace with demand for talc products by manufacturers of paints, ceramics, rubber and paper. It was this increased production that called for the expansion of the Fuller-Kinyon systems for handling finished talc.

Talc from the grinding mills is pneumatically conveyed to storage where it is held until needed for shipment, at which time it is transported pneumatically to bagging or bulk loading. The original installation, now an integral part of the expanded system, included four 400-ton storage silos of concrete construction with conical bottoms and four Fuller-Kinyon pumps, three stationary and one portable.

One of the stationary pumps, a 5-in. unit, Fig. 1, conveys talc from the pebble mill to storage, while an-

Fig. 3: Bulk packing area where talc is pneumatically delivered into paper-lined box cars

other 8-in. unit similarly transports the product of the fluid energy mills. The third stationary unit conveys talc recovered from a dust collector to product storage. An 8-in. portable pump, Fig. 2, mounted on a track beneath the storage silos, is used to empty the silos and move finished talc to bagging machines or box car loading. Talc is delivered to the portable pump by variable-speed feeders that regulate pump capacity to conform to packing rate.

Compressed air for the Fuller-Kinyon conveying system is furnished at the right pressure for efficient and economical operation by Fuller rotary single-stage compressors, Fig. 3. Each pump has its own compressor.

How Conveying System Was Expanded

To keep pace with mounting production, it was decided to increase storage capacity for finished talc. Four flat-bottomed bins, Fig. 4, were erected next to the four original silos, with branch lines and valves, thus enabling both pumps from the grinding mills to fill any of the new bins.

At the same time, since the new bins were not directly above the portable pump, F-H Airslides, Fig. 2, were installed to convey talc from these new bins to the existing pump for movement to packing. Each Airslide consists of an inclined rectangular duct separated into two longitudinal sections by a porous member. Talc is fed into the upper section, and air at low pressure enters the lower section. The air penetrates through the membrane, and because of the uniform permeability of this fabric membrane the talc is thoroughly fluidized. It flows by gravity from bin outlet to the track-mounted pump. Each Airslide is equipped with a cutoff valve operated by air motor. These cutoff valves are actuated by a level indicator in the packing bin.

To get even more storage, a fifth wedge-shaped vertical bin was ingeniously constructed close to two adjoining silos (see Fig. 4). Like the other flat-bottomed bins, this one is connected so both pumps from the grinding mills can fill it. It has an Airslide to carry talc to the portable pump. Still another bin was added during this initial expansion of storage capacity, bringing the total to four silos with conical bottoms and six flat-bottomed bins. This sixth bin was also equipped with branch lines and valves, enabling it to be filled or emptied by the already installed Fuller-Kinyon pumping system.

Not only were storage facilities expanded, but a new packing station (see Fig. 4) was installed to speed shipping of finished talc. Product is conveyed pneumatically by the portable pump beneath the original silos to this second packing station. This completed the initial stage of the company's expansion.

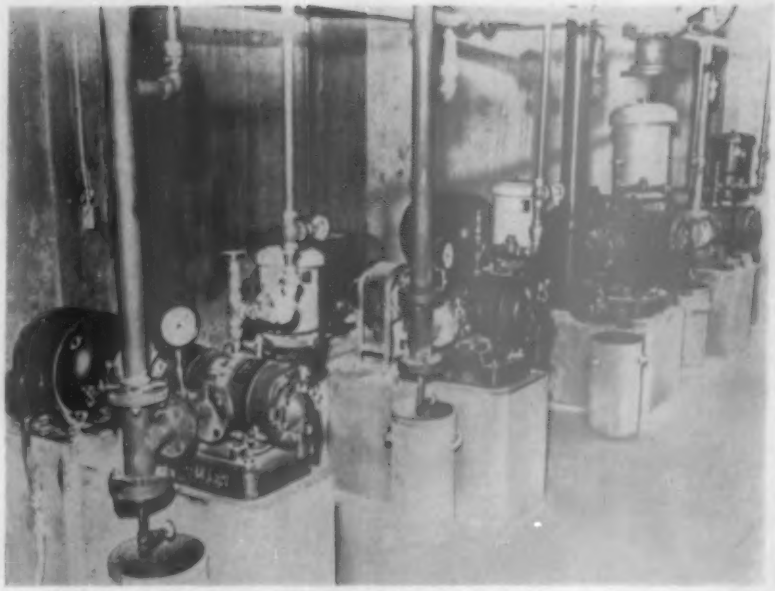


Fig. 3: Bank of four rotary compressors supply air to pumps for moving talc pneumatically through the transporting lines

More recently, the second phase of its expansion was started, adding grinding facilities, a third packing station, and a new silo located about 200 ft. from the original cluster.

To provide separate facilities for handling the exceedingly fine talc from the new grinding mill, and to keep up with increased output, four additional Fuller-Kinyon pumps were installed.

First of these was a new portable pump that runs on the same track as the original portable unit. Separate conveying lines are being put in to handle talc of different grades, and

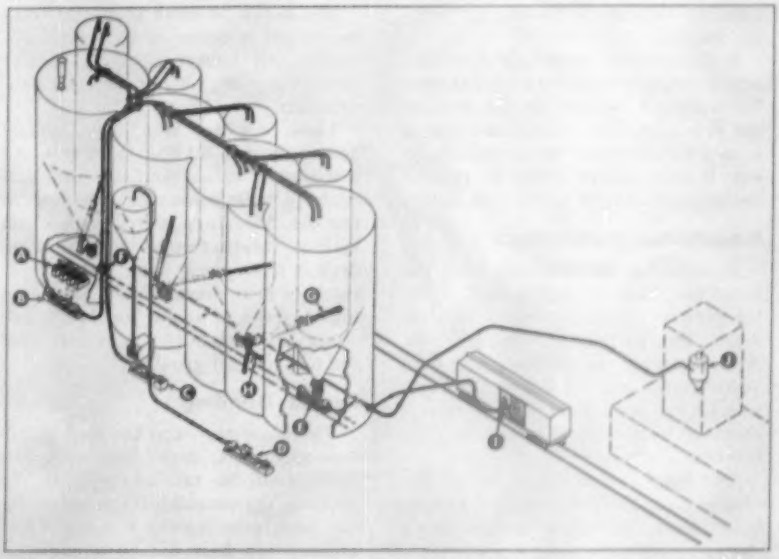


Fig. 4: Schematic drawing showing entire conveying system at the completion of the initial phase of expansion; (A) rotary single-stage compressors; (B) an 8-in. stationary pump to handle finely ground talc from fluid energy mills; (C) a 5-in. pump moves product from the conical grinding mill; (D) third stationary pump transports talc recovered from dust collector to storage; (E) an 8-in. portable pump mounted on track beneath storage silos handles all products to packer bins or bulk loading; (F) samplers in conveying lines to storage; (G) Airslides conveying talc from flat-bottomed bins to portable pump; (H) blower to supply air to Airslides; (I) bulk-loading station; (J) alleviator feeding packer bin

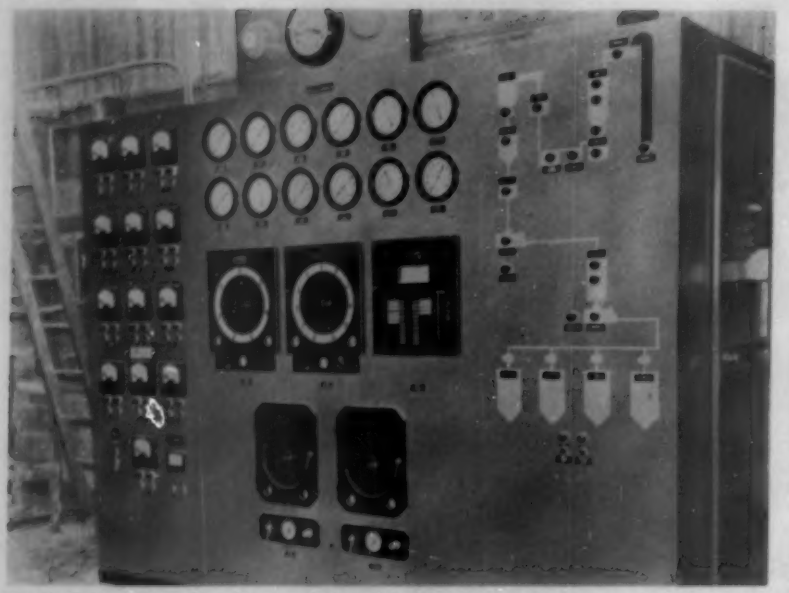


Fig. 6: Central control panel recently installed in connection with a new milling process and an addition to the pneumatic conveying system. The section to the extreme right controls the recently installed conveying system

normally each pump will be assigned to conveying talc within a certain range of fineness. However, the system is highly flexible, and either pump can discharge into either line.

Another new Fuller-Kinyon pump is mounted beneath the first of the new silos. Although stationary at present, it eventually will be track-mounted and will discharge talc from all of the new silos as they are erected. At present, this pump delivers product from the new silo to the second packing station.

A third pump sends talc from the new grinding mill to the wedge-shaped flat-bottomed bin and to the first of the new silos. The fourth new pump is used for emptying the wedge-shaped bin. It can deliver either to two of the original silos or to the new silo.

Manufacturing Operations

In actual production, ore from the mine goes first to a 3-ft. dia. Traylor gyratory primary crusher that reduces the particles to minus 1-in. After crushing, an enclosed belt conveyor carries the ore across the highway to the main plant. Tramp iron is removed by a magnet suspended over the belt.

Ore from the conveyor belt is discharged into three 100-ton wet storage bins. Next, vibratory feeders move the ore from these bins to a conveyor and elevator feeding a Tyler-Niagara screen.

Undersize from the screen is dried in a direct oil-fired rotary dryer, which is 5 ft. in dia. and 25 ft. long. Moderate heat is used, the dried talc emerging at 250 deg. F. Exit gases from the dryer go through a Buell dust collector, and recovered talc is added to the dryer product.

Oversize from the screen drops into a bin from which a constant-weight feeder discharges it into the 3-ft. Symons short-head cone secondary crusher. The product of this crusher, together with the dryer product, goes to a Derrick vibrating screen with 14-mesh openings. The oversize is returned to the secondary crusher.

The minus 14-mesh undersize from the screen is delivered by screw conveyors and bucket elevators to five 500-ton dry ore silos of concrete construction.

These dry ore silos have conical bottoms with a 60 deg. slope to make withdrawal easier and to eliminate bridging with consequent flooding of fine ore. Vibratory Jeffrey feeders and various rotary feeders control withdrawal from these silos, either separately or in any combination for blending. A series of screw conveyors, belt conveyors and bucket elevators feed the talc to final grinding.

Regular Grinding

There are two separate final grinding operations, depending upon the fineness of the talc being made. To produce the coarser particle sizes, the talc undergoes regular grinding. From a 5-ton bin it is fed by a constant-weight feeder into a 5½- x 10-ft. Hardinge conical mill. The mill is Silex-lined and loaded with 32,000 lb. of Coors high-density grinding media. Ground talc from the mill goes to a 12-ft. Raymond separator with a double whizzer that is in closed circuit with the mill. Finished product is screened to remove any foreign matter. The 5-in. Fuller-Kinyon pumping system transports the talc to storage.

Grinding to Less Than Micron Size

For special uses, the company also produces extremely fine talc in micron and submicron particle sizes. To produce these finer grades, the talc goes, not to the conical mill, but to fluid energy mills. Two types of such mills are in use, Wheeler mills and a new type that is undergoing development. The Wheeler mills have no moving parts. Instead, they use high-speed jets of compressed air to make talc particles pulverize each other.

Ore to be ground is carried by screw conveyors and bucket elevators to the individual feed bins of the Wheeler mills. These bins are arranged so that overflow can be recycled, insuring constant feed. Jeffrey Waytrol feeders discharge into the mill hoppers.

Each Wheeler mill is about 5 ft. high and looks like an elongated hollow doughnut standing upright. The reduction chamber in the lower part of the mill has nozzles placed at an angle to the path of the air in the mill. Jets of hot air are injected through these nozzles at high pressure and at a speed of about 1600 ft. per sec. (1100 m.p.h.). Inside the mill this air whirls around at velocities of 150 to 400 m.p.h.

Crushed talc ready for fine grinding is injected through a venturi near the bottom of the mill. Air from the jets picks up this talc and sets it in violent motion. Particles collide with each other at terrific speeds, pulverizing one another. Most of the actual breaking occurs in the reduction chamber. Although there are never more than a few pounds of talc in the mill at one time, the velocity is so great that up to six tons will pass a single point in one minute.

Ground talc is withdrawn from the mill in the stream of air that is continually leaving through an opening in the top section of the fluid energy mill. The velocity of this air is adjusted so that when a particle reaches a small enough size the force exerted by the exiting air overcomes the inertia of the particle and it leaves the mill. Using fluid energy milling, three extremely fine grades of talc are produced with average particle sizes of 6.0, 1.5 and 0.8 microns, respectively.

Air for the Wheeler mills is furnished by a two-stage compressor at 150 p.s.i. discharge pressure, driven by a 1750-hp. synchronous motor. Intake air is drawn through a dry separator and then through two oil-

bath filters to keep talc dust and foreign matter out of the compressor cylinders. The air is preheated by an oil-fired heater to give it greater velocity and to insure that the talc being processed is kept as dry as possible.

Handling Finished Talc

Finely ground talc leaving the fluid energy mills goes through cyclone collectors. The finished product is then moved by screw conveyors to a Derrick vibrating screen to remove any foreign matter. Screened product is pneumatically conveyed by the 8-in. Fuller-Kinyon pumping system to storage. Samples are taken by a pipe-line sampler.

All products from both regular grinding and fluid energy milling are packed for shipment with the same equipment. The 8-in. Fuller-Kinyon rail-mounted portable pump under the storage silos empties bins and silos, transporting talc to a bin over the four-tube St. Regis packers. Talc products are packed in 3-ply and 4-ply, 50-lb. sewed valve bags that vary in size for the different finenesses of talc. Filled bags drop onto a wire mesh conveyor and are carried on roller conveyors into box cars for shipment. Bulk shipments are also made in paper-lined box cars, Fig. 5.

The pneumatic conveying system for finished talc at this plant is highly dependable, requiring little maintenance. Compressors, for example, run for years with no maintenance other than lubrication. Pumps are dismantled to replace worn parts only once a year.

The Fuller conveying system has been found to be extremely flexible, not only in operation but also in its adaptability to expansion. In operation, talc can be moved from any grinding mill to the different silos and bins, and thence to any bagging or bulk loading station, merely by positioning valves. Thus, routing of finished talc can be changed readily, and the flow path followed visually by lights, Fig. 6, on a control board.

Opens New Dolomite Quarry

• Michigan Limestone Division, United States Steel Corp., has started operations at the new Cedarville quarry in Upper Michigan producing eight sizes of stone

WHEN THE SELF-UNLOADING STEAMER CALCITE pulled away from the newly opened Port Dolomite, Mich., with the first cargo of dolomite limestone from the new Cedarville quarry of Michigan Limestone Division, U. S. Steel Corp., it signaled the start of operations which are expected to play an important part in supplying a large volume of flux stone and highway aggregates for the nation's future expansion. Port Dolomite is about 35 miles south of Saulte Ste Marie, Mich.

C. F. Beukema, president of the Michigan Limestone Division, in announcing the opening of the new port on April 16, said that the Steamer Calcite was selected to carry the first cargo because she was the first self-unloader in the Bradley Transportation Line, operated by the division.

Construction of Port Dolomite and the Cedarville quarry was begun in

(Continued on page 77)

***Crushed dolomite** from the primary crusher located on the floor of the quarry 40 ft. below the surface underground tunnel*

***Broken stone from blasting** operations is loaded by a 10-cu. yd. electrically operated shovel to 30-ton capacity haulage trucks*

Overall view of sand and gravel plant with surge stockpile, to the left

Unique SAND PROCESSING In Modern, Centrally Controlled Plant

• Arizona Sand and Rock Co., Phoenix, Ariz., manufactures sand with rod mill, and uses spirals, liquid cyclone and hydraulic sand sizer to recover fines

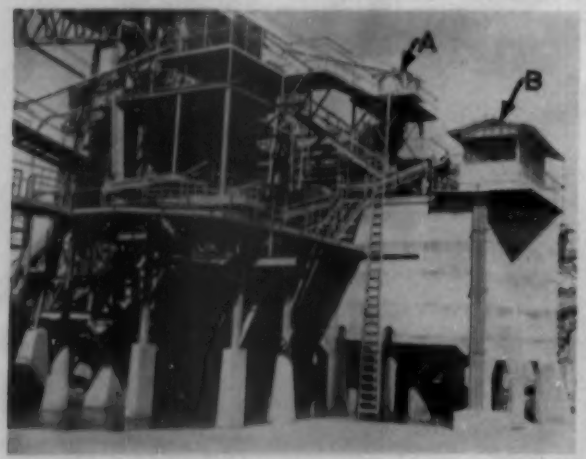
By WALTER B. LENHART

DURING THE PAST TWO YEARS, the Arizona Sand and Rock Co., Phoenix, Ariz., has carried out a rehabilitation program at its sand and gravel operation that virtually amounts to a new plant although in the remodelling some older equipment was incorporated into the design. The plant construction is of reinforced concrete and steel throughout. It is so designed that it has high capacity with operating features resulting in excellent overall efficiency.

The sand processing technique is of special interest as it involves the use of a sand sizer, a liquid cyclone, four sand spirals, and a rod mill to produce concrete, masons, and engine sands. The main elements of the plant are controlled from a centrally located glass-enclosed station situated high enough in the structure so the operator can see the operation.

Operating Features

Operating features include a 12,000-ton capacity surge pile following the primary crusher, a wet plant for production of washed sand and gravel, and a so-called dry plant that produces a 100 percent crushed product. As all material going to the dry plant must first pass through the wet section, the crushed gravel operation produces essentially a washed product. Material from the surge pile is drawn to a 30-in. belt conveyor by a F-5500 Syntron electric vibrating feeder and all material is weighed continuously by a Transitometer. Belt conveyors used throughout the plant range from 30 in. for the belts to and from the surge pile, and 24 in. for all other uses. Ground stored material is reclaimed from a tunnel under the main pile through which trucks can drive and load. Paralleling the truck passage-way is a 30-in. belt conveyor system that delivers aggregate to the company's pre-mix concrete plant that is across the street from the main plant. The company also has a black top plant, and produces a dry, premixed, sand-gravel-portland cement mix that is packed in paper bags and sold throughout the Southwest for the occasional user of concrete. The com-



Left: Feed splitter to sand sizer, below, indicated by (A). In foreground, above piers are the sand spirals, and shown at (B) is the control room. **Right: Controls for practically all plant operations** are located in this room where operator can see in all directions

pany also does general contracting with emphasis on highway work, and recently placed in operation a new Pioneer portable sand and gravel plant that is used mostly as a source of aggregate for the company's contracting jobs that may be too far from the Phoenix plant. The ground storage facilities, pre-mixed concrete, dry packaged cement mix, and black top plants are all part of older operating units.

The Arizona Sand and Rock Co. owns a large acreage adjacent to the plant. This acreage is essentially a part of the Salt River Valley that cuts through the southern edge of Phoenix. Dams, farther up-stream, have taken all the water out of the Salt River for irrigation purposes, leaving a wide and dry river bed in the vicinity of the plant. The gravel is relatively deep with a preponderance of cobbles in the minus 4-in. to 7-in. diameter range. These cobbles are an extremely hard, tough quartzite dark in color and from 30 to 60 tons per day of these rounded gravels are returned to worked out portions of the pit as a part of a long range stockpiling program.

Loading in the pit is done with a 1½-cu. yd. No. 362 Marion, diesel-driven shovel having air controls. It loads to a fleet of three Euclid rear-dump trucks and one White. The haul is short over relatively easy grades to the primary hopper. Over this hopper is a tilting grizzly with 5-in. openings. This device permits the trucks to rear dump over it, and after the truck has passed the entire grizzly tips. Plus rock is returned to the pit. The primary jaw crusher is a 15- x 36-in. Diamond fed by a belt feeder. The crusher uses Alloy Steel & Metals Co. moving and stationary jaws.

Crushing Operation

The cobbles in the oversize bin from the two 5- x 12-ft. Allis-Chalmers, three-deck primary screens are reduced in two No. 636 Allis-Chalmers reduction crushers. If the feed bin gets too full the overflow is chuted to a truck standing alongside the bin and the material is ground stored. Crushed material is moved by belt conveyor to the so-called dry plant where it passes over an Allis-Chalmers three-deck screen from which a ¾-in. special, a ½-in. and a ¼-in. crushed gravel is binned. Oversize from the deck goes to a bin, and from the bin goes to two No. 322 Allis-Chalmers finish crushers. An "I" beam with a chain block and crawl mounted over the crushers is so designed that parts can be lifted out and loaded direct to a truck. Crushed material can go back to the screen, or to the belt conveyor from the surge pile (No. 2 belt). The screen has ⅞-in., ½-in., and ¼-in. wire, respectively. When it is desired to make "ABC" material (Aggregate Base Course), the screen can be by-passed and all the throughs from the two No. 622 Allis-Chalmers crushers sent to the belt conveyor from the surge pile. "ABC" is a dry run, minus 1½-in. material.

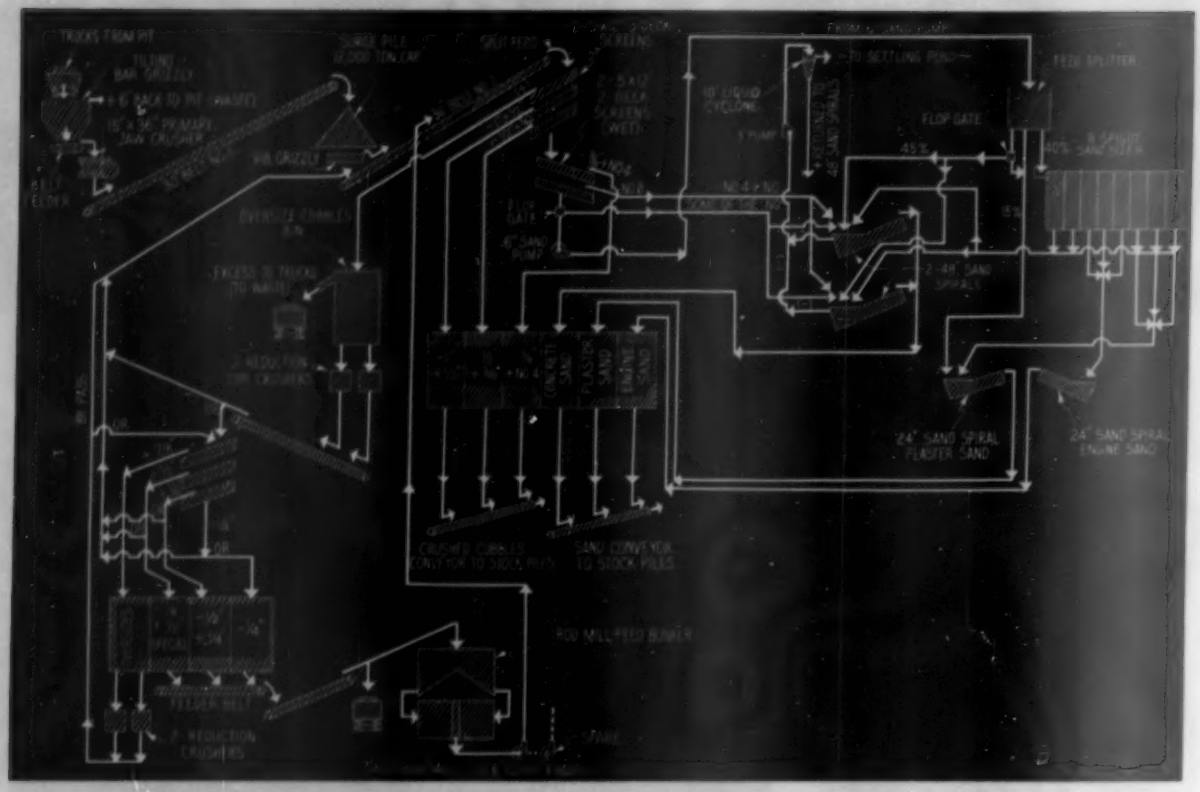
Looking toward surge pile from modernized plant

As there is not enough sand in the deposit, an Allis-Chalmers rod mill is used to make up the marketing requirements. As the natural sand is high in the 20 to 30-mesh sizes, some of this size is taken out and sold as engine sand. Extremely fine sand that normally would be lost as an overflow product from conventional classification and de-watering is recovered by a Krebs liquid cyclone.

Sand Processing

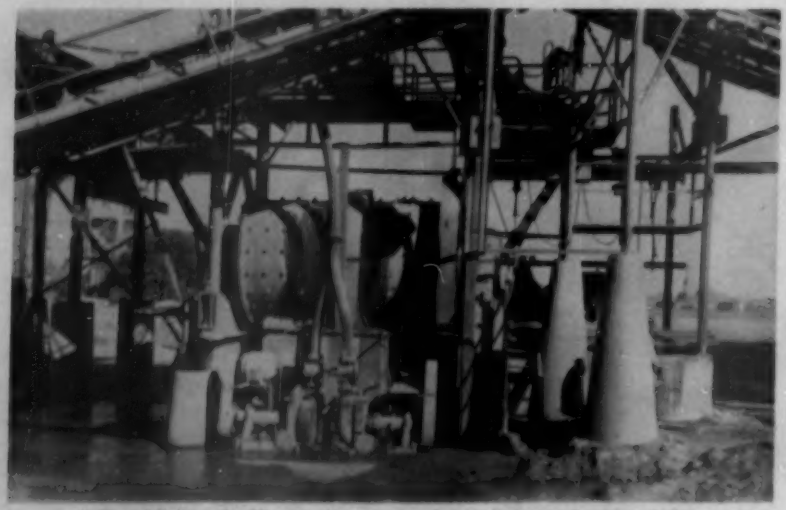
Sand processing starts with material taken from the surge pile, the flow of

Aggregate for ready-mixed concrete batching plant is sent by belt conveyor in large concrete tunnel under street to batcher tower. Trucks may be loaded from same tunnel



Flowsheet of crushing, screening, and fine sand recovery operations

which is split to two 5- x 12-ft. Allis-Chalmers three-deck screens where the over-size (cobbles), the ½-in. to 1-in. and the ½-in. to ⅜-in. are all sent to bins. The minus ⅜-in. from the lower decks of these two screens next passes to two 5- x 12-ft. Allis-Chalmers two-deck screens, operated wet. The material on the top deck, minus ⅜-in., plus No. 4, is binned. The material on the lower deck (minus No. 4, plus ⅛-in.), is split to two 48-in. Wemco sand preparation machines that produce the concrete sand. Other sand flows to these two machines which includes a relatively small part of the material through the lower deck (minus ⅛-in.). A flop gate near the underside of the screen is used to make the split. The larger fraction of minus ⅛-in. sand from the two screens is picked up by a rubber-lined, 6-in. Hydroseal pump and delivered to a Deister Concenco feed splitter mounted high in the plant. This makes a three-way split; 40 percent going to an 8-spigot, Dorrco sand sizer, 45 percent flowing direct to the two 48-in. Wemco sand spirals previously mentioned, and 15 percent going to a 24-in. Wemco sand spiral for preparation of the plaster or masons sand. In addition a flop gate on the line which carries the 45 percent to the two concrete sand spirals can be used to regulate the amount going to the masons sand spiral.



A 7- x 12-ft. rod mill manufactures sand; two 6-in. sand pumps, below

The Dorrco sand sizer is a hindered settling device. Fresh water from a constant head tank is introduced into the eight settling columns with a Honeywell Pressuretrol system to control the discharge to insure positive and accurate unloading of each settling column. Pulp flows into one end of the device and through the eight settling columns, the first column recovering the coarser size and each remaining settling column recovering progressively finer sizes. About 30 t.p.h. goes to the Dorrco sand sizer but the amount is subject to changes. At the Arizona Sand and Rock Co. plant, the settled product from the first two columns goes in a split feed to two 48-in. Wemco sand spirals. The product from the next three columns all goes to a second 24-in. Wemco sand spiral that produces the engine sand. The finer

material from the last three columns can be split, one fraction going to the two 48-in. concrete sand spirals and the remaining fraction to the 24-in. sand spiral producing the masons sand.

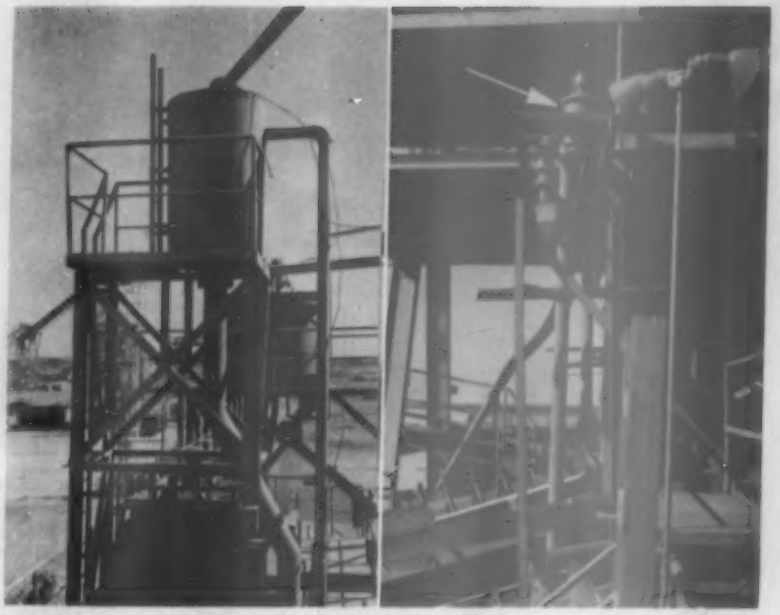
Under, and parallel to the long axis of the Dorrco sand sizer, are two launders. Each spigot product is received by a company-made, cup arrangement with a snout-like outlet. The assembly can be hand rotated in a horizontal plane in such a manner that all, or any part, of the spigot material can be split to one of the two parallel launders so that an extremely high degree of flexibility in gradation can be obtained.

A part of the fine overflow pulp from the two 48-in. Wemco sand spirals is picked up by a 3-in. Wemco sand pump, and delivered to an EE-10-4 Krebs liquid cyclone. This unit recovers practically all of the 200 to 325-mesh sand sent to it. The fine sand is returned and split to the two 48-in. sand spirals where it mixes and blends with the concrete sand. Overflow water from the four sand spirals, the Krebs cyclone, and the Dorrco sand sizer flow to a settling pond and reclaimed water pumped back to the first Allis-Chalmers screens in the plant. An 8-in. Johnson well pump returns this used water to the plant and it uses a 50-hp. motor.

The tailing pond return water pump is located in a sump that is immersed in and is a part of the tailing pond. Only top water from the pond overflows into the sump so that the clearest water obtainable is secured by this innovation. Fine sand and silt that settles out in the pond is bailed out from time to time. Later liquid cyclones may be mounted high around the edge of the pond so that 95 to 97 percent of the solids going to the pond will be retained at the rim. The fine material makes an excellent mineral filler for asphalt work.

Rod Mill Operation

In the past ROCK PRODUCTS has published many articles describing the use and results obtained by rod mills. Most of these referred to an 8- x 12-ft. rod mill. However, for the first time data is available relating to a smaller size, a 7- x 12-ft. rod mill. It has a peripheral discharge with feed going into both ends, and the ground pulp discharges through ports in the center line of the shell. The rod mill is driven by a 250-hp. motor through a Falk reduction unit. It is grinding 38 to 40 t.p.h., using as feed a variable blend of ¾-in. to ¼-in. crushed gravel from the dry plant, the blend depending on amounts of each type available over and above market requirements. The rod mill discharge



Left: Constant head tank, foreground, for sand sizer, below. Feed splitter, in background, sends pulp to sand sizer. Right: Arrow points to 10-in. liquid cyclone for recovery of fine sand sizes. Recovered sand (200 mesh sizes) flows to one of 48-in. sand spirals below to bring up fines in concrete sand

Sand sizer which prepares concrete, engine and masons sands

Haulage unit being loaded by 1½-cu. yd. shovel

Part of the stockpile over reclaiming belt conveyor tunnel in which trucks operate as well as the conveyor

has the following typical analysis:

Mesh	Percent Passing
4	100.0
8	90.8
16	67.8
30	38.8
50	14.8
100	3.8
200	1.4

F.M. 2.84

The mill is lined with Ni-Hard liners at both ends and shell, and in eight months of operation the wear on liners is negligible. The mill is charged with 30 tons of 3-in. dia. steel rods and two rods are added each day to make up for wear. The charge occupies about 45 percent of the mill volume. Character of the discharge can be varied by controlling pulp density. Adding water tends to make a coarser discharge. The mill produces a graded sand that is roughly 20 percent of the plant's sand production.

Feed to the rod mill is on a volumetric basis. Under the bins in the dry plant is a horizontal running belt conveyor with chutes discharging to it from all bins except the oversize bin. This belt feeds an inclined belt conveyor that delivers to a dual-hoppered steel bin over the rod mill. Two feeder belt conveyors, one at each end of the Allis-Chalmers rod mill, feed the dry material to the grinding unit. The gates to the belt control the amount being fed by the height of their openings. Pulp from the rod mill, picked up by one of two 6-in. Wemco pumps (one is a spare), is delivered to the first wet sizing screen so that a part of the rod mill product can be in any of the three types of sand produced at the plant. The flow diagram gives the essentials of the processing techniques.

The Krebs liquid cyclone receives a feed from the 48-in. Wemco sand spirals which is 8 to 9 percent solids and yields 2.455 t.p.h. of sand with the following screen analysis:

Mesh	Percent Passing
30	100.0
50	99.2
60	98.1
70	96.7
80	93.1
100	82.8
200	40.0
325	27.6

It is estimated that the Krebs cyclone is recovering about 97 percent of the material going to it. There is very little clay in the feed. The waste overflow could be classed as cloudy. Pulp is pumped into the rubber-lined Krebs cyclone at 25 p.s.i. and no attempt is made to maintain a ropy discharge as the recovered sand is de-watered later in the two 48-in. sand spirals. A 20-hp. 1300 r.p.m. motor drives the 3-in. Wemco sand pump which delivers to the Krebs cyclone. Wear on the assembly, after three months, is insignificant.

The engine sand is essentially a sand with the plus and minus 20 to 30 mesh removed. Southern Pacific railroad specifications require a maximum of 10 percent retained on a 20 mesh with 100 percent passing a 10 mesh. Also, a maximum of 10 percent passing a 65 (Tyler) and one percent passing the 200 mesh. A typical analysis of engine sand as produced at the plant is as follows:

Mesh	Percent Passing
10	100.0
20	99.6
35	43.6
48	5.0
65	1.6
200	0.2

About 80 percent of the belts in the plant are Hamilton. The remainder are Goodrich and Goodyear. Idlers in the new plant are mostly Stephens-Adamson Co. with some Robins. The plant has a capacity of 500 to 550 t.p.h.

Garage and Repair Facilities

A new, modern garage and repair shop was recently completed. It is especially designed to maintain the mobile equipment of the Arizona Sand and Rock Co. An overhead crane of sufficient capacity to lift an entire mixer truck is available. At one end of the shop and above the working floor, the company has built the superintendent's office. It is glass-enclosed so he can see from his desk the shop floor and also most of the sand and gravel plant. Alongside the shop is a lubrication rack with modern facilities so that preventive maintenance can be easily practiced.

The plant was designed under the direction of the company's engineering staff. Many of the features in the new plant were worked out by Al Carter, former general superintendent who for the past 25 years was with the company. He has gone into business for himself at Flagstaff, Ariz. P. H. Haumont is now superintendent. D. W. Kelley is president of the Arizona Sand and Rock Co., and James A. Murphy is executive vice-president and general manager. M. D. Crandall is secretary-treasurer. H. P. McIntosh is materials engineer, and Ed Featherstone is dispatcher.

Ready-mixed concrete plant across highway from gravel plant with a belt conveyor under pavement inclining up to batching tower

• National Gypsum Co., opening gypsum mine at 400-ft. depth in southern Indiana near Shoals in Martin County. Wallboard and plaster plant will be completed this summer

Artist's conception of how the new Shoals, Ind., plant will look when it is completed

First Gypsum Plant In Indiana

LOCATED ABOUT 50 MILES FROM THE KENTUCKY BORDER in southern Indiana is the small town of Shoals with a population of about 1100. This town is destined to have a rapid growth as the center of the new gypsum discovery by National Gypsum Co., which is now building a wallboard and calcining plant, and has opened a mine at the 400-ft. level which will be the second deepest in the entire country. The United States Gypsum Co., and the Rubberoid Co., also will mine and process gypsum into wallboard and plaster products in this area. Other rock products industries which have been attracted to this area include a concern which will process native quartz into refractory material and deposits of good quality kaolin have been found in Martin county.

Work at the National Gypsum Co. mine is progressing rapidly on the 2000-ft. mine shaft which will dip at angle of 18 deg. down 293 ft. below the bed of gypsum. Drilling and dynamiting crews are deepening the shaft at an average of 21 ft. per day. Blasting is done with 250-lb. dynamite charges. Tractor-shovels move in after each blast and load the muck (slate, shale, limestone and coal) into small mine cars which are hauled to the surface where a tipple trip-dumps the loads into a hopper. The waste rock is loaded from the hopper into trucks and hauled away as fill and ballast for roads leading to the plant.

The shaft will level out and head straight into the mineral deposit when it is about 400 ft. underground. Roadways approximately 25 ft. wide will be cut through the gypsum rock to provide space for a primary crusher, maintenance shop, office, locker room and electric generating station. There will be a 40,000-gal. sump for collecting water seepage.

Mining will be done by the room-and-pillar method. Shovels will load the broken rock into trucks which will haul it to a primary crusher. From the crusher, the gypsum product will move up a belt conveyor in the mine shaft to the surface and process plant for further crushing, grinding and screening, and final processing into plaster and wallboard products. The shaft itself will be divided into two compartments, one of which will be used by the belt conveyor and serve as an exhaust air vent, and the other will be equipped with a cable car to transport personnel, supplies and fresh air.

The plaster mill and wallboard plant will be under one roof to facilitate mixed car loading. The warehouse and loading dock will not have a single supporting pillar to interfere with lift truck movements. A continuous gypsum calcining method will be used instead of the batch system. Robert E. Scifres, plant manager, expects that actual manufacture of gypsum products will start this summer. The plant is now more than 75 percent completed.

Construction of a 1¾-mile railroad spur track to the mine and plant, location of an adequate source of water, and the installation of electric, gas, telephone and other utilities also presented difficult engineering problems. To meet railroad grade requirements, mountainous hills had to be leveled as much as 75 ft., and the "borrow" material was used to fill the low spots. These operations also involved the correction of drainage problems. It was also necessary to tap an underground lake two miles from the plant to get sufficient water as test drilling in the vicinity of the plant to a depth of 500 ft. was not successful in obtaining an adequate source of water.

Sound-Insulating Wall and Floor Constructions

THE UNITED STATES DEPARTMENT OF COMMERCE, National Bureau of Standards, has prepared its Building Materials and Structures Report 144, entitled "Sound Insulation of Wall and Floor Constructions." The 66-page booklet summarizes data on the sound transmission of door, wall and floor constructions, discussing general principles of sound insulation, and factors governing transmission of airborne and impact sound in structures. Suspended ceilings, floating floors, staggered studs, and other types of sound-insulating constructions are discussed, and details of sound transmission measurement are given. Tables give sound-transmission loss for walls of wood lath on wood studs; expanded metal lath on wood studs; gypsum board and lath on wood studs; gypsum lath held by special nails, by stiff clips or spring clips on wood studs; gypsum lath held by spring clips or wire ties to steel studs; glass-fiber board and expanded-metal lath on steel studs; etc. Tables on sound-transmission loss for floors with steel joists; steel sections; wood joists; concrete slabs; combination tile and concrete; and flat arch are also given. The report is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at a cost of 40¢ per copy.

Sintering plant for manufacture of expanded shale lightweight aggregate

Use Sintering Process to Make LIGHTWEIGHT AGGREGATE

• Onondaga Brick Corp., Warners, N. Y., has remodeled and enlarged its plant for the production of expanded shale lightweight aggregate. Annual production 200,000 cu. yd.

TO PRODUCE AN EXPANDED SHALE LIGHTWEIGHT AGGREGATE, the Onondaga Brick Corp. plant at Warners, N. Y., has been remodeled and enlarged. The new sintered lightweight aggregate has been given the name, Onondaga Haydite, according to R. G. Hardy, general manager of the company. The company produces the aggregate only, Mr. Hardy pointed out.

The process employs the Dwight-Lloyd sintering machine. In this process the shale and a small percentage, usually less than 10 percent, of coal or coke are intimately mixed and placed on a traveling grate. By means of a small ignition chamber, the fuel is ignited and air is pulled down through the sinter charge to continue the combustion of the coal or coke. When the fuel has been consumed, the resulting fired porous mass is allowed to cool and then crushed and screened to meet trade specifications.

Two principal raw materials are used, fuel (coal or coke) and shale. The coal or coke used is dictated largely by their quality and firing properties. The shale is from the Vernon formation in New York State, having been used at various times for the manufacture of heavy ceramic products.

The shale bank presents a uniform deposit of material with a working face of 25 to 110 ft. in height. At the foot of its present working face is a seam of fairly soft clay. By drilling and blasting in this soft vein large quantities of shale can be brought down thoroughly shattered for subsequent shovel loading. The shale is transported to the plant in dump trucks. It is planned to mine and haul sufficient material in 8 hr. to permit sintering for 24 hr.

The trucks discharge into a large receiving hopper from which a vibrating feeder feeds the shale to a hammermill crusher. The material from this operation is elevated and conveyed to a large storage area for subsequent reclaiming.

For grinding to proper final size for sintering, the shale is reclaimed from this storage area by two drag conveyors for discharge into dry pans. These are adjusted to deliver a product substantially 100 percent smaller than ¼ in. Bucket elevators move this material from the dry pans into a small proportioning bin.

Sintering Operation

The sintering operation involves four steps: (1) proportioning of the raw materials; (2) mixing the materials; (3) burning out the fuel to cause the shale to coalesce into a hard

spongy mass; and (4) primary crushing of the resultant mass.

For step (1), the materials, fuel and shale, plus a portion of shale that has been previously fired are proportioned out of storage bins by remote controlled variable speed feeders. These materials are discharged onto a collector belt conveyor feeding a bucket elevator which in turn discharges the material into a pelletizer.

Step (2), or mixing, is done in the pelletizer which is a revolving cylinder. Here all ingredients are thoroughly blended and a certain proportion of water added. This mixed charge then feeds out of the pelletizer through a spout onto the sintering grates.

In step (3), the sintering machine has a slowly moving continuous hearth which passes under an ignition hood where the coal of the charge is ignited by an oil fired flame. A large fan pulls air through the ignited charge causing the fuel to burn. This generates sufficient heat to make the shale pyro-plastic and coalesce into a hard spongy mass.

Step (4), when the coal has been consumed, the resulting sintered mass is fed into a special type crusher that breaks it into particles minus 4-in. size. This material is then passed over a vibrating conveyor which also takes out a certain proportion of sintered material for reuse as well as to convey the bulk of the product to primary storage for cooling and final processing.

Lightweight aggregate is given a final preparation for market by crushing and screening to produce a product of known sizes and gradation. To do this, the material is drawn from the primary storage area by a reclaiming belt conveyor in a tunnel below the stockpile and passed through a crusher. It is then moved by belt conveyor to two double-deck vibrating screens with the oversize going through a second crusher. The product from the second crusher is then returned by belt conveyor over the screens for rescreening. This second crusher is adjusted to produce a finer product than the first. At least three separate sizes are produced by the screens, each of which can be moved by belt conveyor to storage piles, railroad cars or trucks.

The estimated overall plant capacity, material requirements, and labor requirements based on a 6-day week, 50-week year, and operating 24-hr. a day is as follows: yearly output, 200,000 cu. yd. raw material; shale, 150,000 tons; coal, 15,000 tons; oil, 200,000 gal.; operating personnel, 14.

New Dolomite Quarry

(Continued from page 69)

April, 1953, with the first production of dolomite scheduled for this spring. The Cedarville quarry has an annual rated production capacity of approximately 3,000,000 tons, and was opened to supplement the high calcium limestone production of the Calcite quarry near Rogers City. By blending the high calcium stone from Calcite with the high magnesium stone from Cedarville to certain specifications, it is expected that superior metallurgical and chemical grades of limestone can be produced in the complete range from highest calcium content to highest magnesium content. Limestone from the new quarry approximates 45 percent magnesium carbonate and 55 percent calcium carbonate. The deposit lies near the surface.

The exceptional hardness, toughness, and soundness of the Cedarville stone is said to make it ideal as an aggregate for highway and other concrete and bituminous work.

Facilities at the quarry include a primary crusher which was installed on the floor of the quarry, some 40 ft. below the surface. Stone is hauled from the quarry to Port Dolomite over a new railroad that extends more than five miles across swamp and rugged terrain.

The dock at Port Dolomite is 620 ft. long and 117 ft. wide, and is located on the edge of a natural deep water channel leading into Lake Huron. A traveling loading shuttle moves along the length of the dock so that freighters can remain stationary while receiving the load. This shortens the loading time to about 5 hr.

Other Port Dolomite facilities include secondary and tertiary crushers and a screening plant. Stone is simultaneously processed into eight washed grades or sizes, all of which can be varied. The equipment has a rated capacity of 1800 t.p.h.

Diesel-electric locomotives and side dump cars carry crushed dolomite from the new Cedarville, Mich., quarry to a processing plant and loading dock at Port Dolomite, five miles away

Fig. 5: First of a series of sequence photographs taken at the Clifton, N. J. quarry. This shot was loaded and fired as shown in the sketch, Fig. 4. One-third of a second after initiation, the only movement apparent is at the lower right. Note lack of geysering. **Fig. 6:** Two thirds of a second after initiation movement of entire burden has begun in the downward and outward direction with the lower section of the burden leading. **Fig. 7:** Entire burden is falling after a full second. Note excellent control of throw

GOOD BLASTING Practice Can Improve Community

IN THIS ARTICLE

. . . the writer relates sound blasting practices to the problem of public relations. Read it, and you'll see how complaints of flying rock, ground vibration and air blast can be just about eliminated through millisecond blasting—and relations with quarry operators' neighbors vastly improved! You'll also have pointed out that spacing and burden, adequate stemming, correct powder factor, and proper initiation of the blast all have contributed to reducing the sources of public complaint . . . Use of seismic and photographic records have a dual purpose; of defense against unjust complaints and best use of blasting agents.

By JOHN L. ROMIG*

AMERICAN BUSINESS AND INDUSTRY have recently become more aware of the necessity of maintaining good public relations while carrying on their everyday affairs. Quarrying is no exception. Many an operator has watched the urban and suburban scene expand to surround and complicate his once isolated operation. More than one operator who has ignored this intrusion of the general public and gone ahead as usual has regretted the decision. Injunctions, litigation, fines, and even jail sentences have been among the rewards to the incautious.

Uncontrolled blasting is probably the greatest destroyer of public good will. Dust and noise do not make friends either, but reckless blasting can be the last straw. The shock and surprise of a blast coupled with the general fear of explosives held by the lay public makes the human reaction to blasting especially volatile.

Blast effects which create ill will and cause complaints are flying rock, ground vibration and air blast. Damage due to flying rock is probably easiest to assess and easiest to control. Remedies include adequate stemming, proper powder factor and initiation of the blast at the point of maximum confinement.

Damage due to ground vibration is another story. Some fantastic claims have been based on damage from this source, including the defertilization of eggs in incubators. In the past, accurate scientific records of ground vibrations and an explanation of their effects have been ignored by juries in favor of the imaginative guesses of the claimant regarding the damage caused by blasting.

However, with the increased prestige of seismograph companies and judicial recognition of the value of their opinion on this subject, seismic recordings can usually settle any doubts as to actual structural damage due to ground vibrations. Many quarry operators find it advantageous to have seismic records made even before any public sentiment has formed against them. This is a valuable public relations gesture because it shows the operator's concern about the welfare of his neighbors.

Air blast is a less measurable factor in public relations and legal proceedings. The 'snap' of air vibration is the most startling factor of a blast and calls the attention of the neighbors to whatever ground vibration may have occurred—"and to whatever may need repairing in the house."

If the quarry operator is willing to take steps to reduce air blast, he can improve relations with his neighbors, as well as reduce complaints of damage. Here again the remedies are usually quite simple. Adequate stemming, proper attention to point of initiation, and careful selection of spacing and burden usually can work together in muffling the noise of the blast. The blaster also may lessen his neighbors' grief by carefully observing the burden from the face to detect faults and other points of weakness. By decking his charge around these points, he can often avoid considerable noise and, incidentally, some wild flying rock.

It is generally recognized that short-

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Relations

period or split second delay blasting has helped the quarry operator gain better public relations along with increased breakage of rock. This system of initiating various holes of a multiple hole shot at time intervals measured in milliseconds has, in many instances, allowed larger shots to be made than those which previously had caused complaint when fired instantaneously. This decrease in the amount of vibration and noise for a given amount of explosive, which usually results from the practice of short delay detonation, is partially attributed to the breaking up of one large blast into a series of smaller blasts.

Fig. 8: End result of blast at Clifton, N. J. quarry is a well broken, well placed muck pile. Controlled blasts of this kind have allowed this company to keep operating in a populous area

In addition to offering the possibility of increasing the amount of explosive without increasing vibration, shock, or noise, millisecond delay offers the blaster a means of controlling throw. In multiple hole and multiple row blasting this ability to blast one section of the bench first and present a new free face to each succeeding blast seems to direct the throw toward the hole or row previously detonated. This method has been successfully practiced in many quarry operations to provide a more workable muck pile, and to help minimize flying rock.

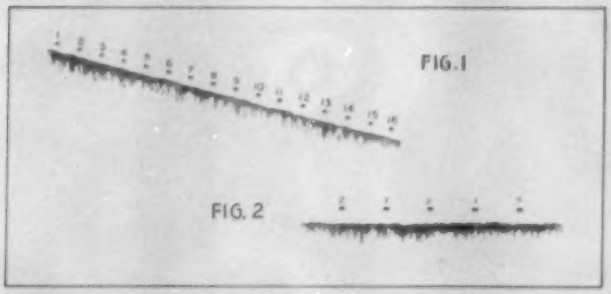
Various types of millisecond delay are offered by explosives manufacturers. A typical one comprises 17 electric blasting caps of different delays. They are numbered in series. The No. O cap is instantaneous. The No. 16 has a built in delay of 550 milliseconds. The number of caps in these delay series allow an almost infinite variation in patterns, and it would seem that patterns could be adapted which would meet practically every situation.

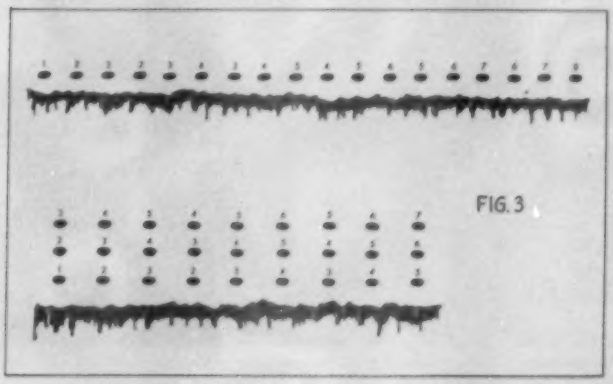
Originally the so-called progressive pattern was used when reduction of noise and shock was the primary objective. This pattern consisted of detonating a row of holes in a progressive sequence, (Fig. 1). The results of this pattern were satisfactory but more recently it has been found that alternate patterns (Fig. 2), and alternate-progressive patterns (Fig. 3), do not result in appreciably greater shock or noise while usually providing better breakage and more workable muck. This is apparently attributable to the fact that millisecond-delay caps are accurate only within several milliseconds of the rated delay. Due to this built-in variation, caps of the same nominal delay time do not normally detonate at precisely the same instant, although they do stay within their controlled time area.

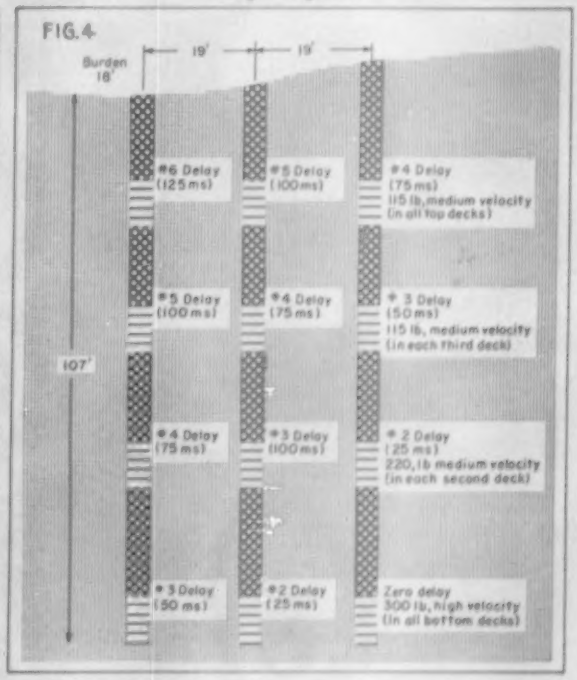
The progressive and the alternate-progressive patterns are only two of many patterns of delay blasting available to the blasting engineer to try to solve his blasting-public relations problems. Variations may include

Fig. 1: A progressive pattern of millisecond delay initiation. **Fig. 2:** A typical alternate pattern of initiation. **Fig. 3:** Examples of alternate-progressive patterns of initiation, showing application to both single row and multiple row blasts

Fig. 4: Sketch of loading and firing pattern used by the Union Building and Construction Co., at the Clifton, N. J. quarry. Delay firing of decked charges reduces vibration and adequate stemming and proper point of initiation minimizes "air snap." Large diameter ammonium nitrate cartridges containing gelatin cores are used in all charges. Velocity of powder varies directly with the strength of gelatin







velocities of explosives used and employing different millisecond delay periods in individual holes.

An unusual blasting pattern is used by the Union Building and Construction Co., Clifton, N. J. In the center of a residential area this quarry was faced with a definite public relations problem. Using three 107-ft. holes spaced 19 ft. apart with an average burden of 18 ft., this company decked 750 lb. of explosives in each hole in four decks and set off these charges with millisecond delay caps as indicated in Fig. 4. Developed by Superintendent Nicholas Van der Kamp, this type of blast has allowed Union Building and Construction Co. to keep operating and still maintain good public relations.

Control may also be exercised over a blast by the proper choice of the point of initiation. Air blast and wild rock are most often the result of the blowing off of the collar of the hole. By detonating the charge where it is most confined, usually at the bottom of the hole, the possibility of the premature escape of gasses up through the hole itself seems to be minimized, and, as a result, air blast and flying rock from the collar are reduced.

Adequate stemming of suitable material is another important factor in reducing the amount of wild rock and in muffling sounds. Coarse dry sand is generally considered the best stemming material for vertical holes, with rock dust a second choice. Used in sufficient quantities, stemming has served to help reduce complaints due to blasting in heavily populated areas. Large diameter holes require from 15 to 20 ft. of stemming. When the noise problem is critical, many operators like to use from 8 to 12 ft. in wagon drill holes. Properly stemming shallow holes is a problem. However, they should be stemmed as well as possible to obtain best results.

Photographic and seismic records of actual blasts may aid the quarry operator in several ways. When working in a new area the use of a seismograph can help determine the best amount of explosive and the correct detonation pattern to use in order to gain good results without annoying neighbors. Photographic and seismic records may also be useful as evidence in any court action resulting from blasting operations.

The most difficult phase of the problem of public relations and blasting is the human reaction itself. The reaction of each individual to a specific blast can be expected to be different. Weather conditions, health, emotional condition, and physical activity at the time of the blast can all be expected to influence persons affected. Experience has developed no exact rules on how people will react to a blast, however, it has produced some general conclusions.

Blasts apparently cause less complaint if fired at a time when people are busy and not resting or inactive. The period just before noon seems to be a good time to blast. More people are busy at this time and small children are apt to be awake.

It is considered good practice to make the time of a shot known. If expecting a little vibration and shock, people are not as startled and seem to be less disturbed by it. On the other hand, people having been informed of an impending blast have lodged complaints about shots which were not even fired, having been postponed for one reason or another.

One study into the reaction of humans to vibration disclosed that people apparently react differently to these vibrations according to their body positions. It also appears that the frequency of the vibrations has as much significance as their amplitude. Low frequency vibrations seem to be less perceptible to humans than higher frequency vibrations of the same

Fig. 10: Shot at the Millington, N. J. quarry. Greenhouse, above, stands directly behind the blast

amplitude. This study, by the Germans Reiher and Meister in the 1930's, indicated that very low frequency vibrations of sufficient amplitude to damage structures might not be considered objectionable to humans while higher frequency vibrations might be objectionable even though they were of insufficient amplitude to cause damage to structures. However, these studies of human reaction to vibrations are based on steady state motions and there is no conclusive data to indicate just how much the "startle effect" of impact transients, as a result from blasting, magnifies this reaction. It must also be remembered that emotional reaction to blasting is quite likely to be as much a result of air blast or "snap" as of ground vibration.

Where possible it might be wise to attempt to influence public opinion positively. Projects to illustrate the absence of harmful results of blasting might be profitably employed. An example of such a public relations illustration is a glass house erected only 400 ft. from the working face at the Millington, N. J., quarry of the North Jersey Quarry Co. Still unharmed by blasting after two years, this positive demonstration is more effective in influencing public opinion than regular technical data.

The necessity of maintaining public good will is no longer obscure to most quarry men. Complaints, litigation, and jail sentences are costly in time and money. A few of the methods by which blasting engineers can attempt to get satisfactory blast results and still have good neighbors have been discussed in this article. However, as stated before, each blast presents an altogether new problem. The operator who finds his blasting problem particularly vexing can receive assistance from the trained field representatives of the powder manufacturers. Schooled in the newest methods and posssessing varied experience, they can often help the perplexed blaster solve his own particular problem.

All of the foregoing methods and ideas will be useless if the operator does not live up to his responsibility to clear the danger area prior to the blast, seal it off during the blast, and deny access to it until it has definitely been established that no hazards remain as a result of the blast. This fact is so obvious that it would seem unnecessary to mention it. Nevertheless, haphazard traffic control in the blast area has cost some operators money, time and loss of public favor in the not too distant past.

Nearly everyone likes to be liked by his neighbors. No quarry operator is consciously looking for ill will any more than he is anxious to have his schedule upset by the revocation of his blasting permit. However, the use of explosives is always a problem and is especially tricky when done in populous areas, where the possibility of trouble due to adverse public opinion is ever present. Perhaps the employment of some or all of the techniques discussed in this article will produce better blasts and make better neighbors of, and for, quarry operators.

Fig. 9: Greenhouse erected near the working face of the Millington, N. J., quarry of the North Jersey Quarry Co. demonstrates absence of harmful blast vibration effects

Study Contract Work Hours Standard Act

THE NATIONAL CRUSHED STONE ASSOCIATION has had an analysis prepared of the proposed Contract Work Hours Standard Act (S. 1204), and suggests that the industry acquaint their Senators with their viewpoints. The legislative proposal was introduced by Republican Senators Smith, Ives, Purtell, Bender, and Cass, memmembers of the Senate Labor Committee, and has the endorsement of the Labor Department. It was initially announced as a simplification and standardization of all federally imposed labor standards, but according to the analysis, is being used as a potential vehicle for greatly expanding the coverage of existing federal labor standard laws, and extending government surveillance of private industry into many areas which hitherto have been free of such interference.

The Bill would apply to contracts made "for or on behalf of" the United States, which would include subcontracts under government contracts and also appear to include contracts with materialmen. Contracts "for work financed in whole or in part by loans or grants from, or loans insured or guaranteed by, the United States or any agency or instrumentality thereof" also come under the proposed bill. Time and one half the "basic rate of pay" would be paid to "laborers and mechanics, including watchmen and guards," for all work in excess of 8 hr. in any calendar day or 40 hr. in any workweek in performance of contracts subject to the Act.

The Bill has its own enforcement and penalty provisions by which the government would withhold payments to a contractor or subcontractor allegedly violating the proposed Act, of all unpaid overtime wages due to the contractor's employes plus liquidated damages at the rate of $5 per day violation. In addition to the provision for liquidated damages, criminal penalties of up to $1000 fine and six months imprisonment are imposed for each "intentional" violation of the Act.

In the event of violation of its provisions, the Bill provides that both the prime contractor and any subcontractor shall be liable for unpaid overtime wages and liquidated damages. Thus, each prime contractor covered by the Act, would have to police the operations of his subcontractors and material suppliers to avoid incurring heavy financial penalties on their account.

The Secretary of Labor would have broad regulatory and interpretative powers including the right to allow "reasonable variations, tolerances, and exemptions," from any or all of the Bill's provisions. The Bill would repeal the 8-hr. law and various other statutes relating to that law, but would not affect the Walsh-Healy Act, the Davis-Bacon act or any other federal labor standard law.

•

NORTH AMERICAN CEMENT CORP., directors have approved a four-for-three split of Class A and Class B common shares.

Left: Plant specializing in masons sand. Both belt conveyors are driven by individual gasoline engines through a 40-ft. long shaft. **Right: Close-up of 3- x 6-ft. screen** above water scalpers and de-watering screw for masons sand

Small Masons Sand Producer Has Simple, Efficient, Compact Plant

As the Denver, Colorado, market for concrete sand is highly competitive, Lester E. Jones is content to supply only a masons and plaster sand. His operation, located in the northeast section of the city is a very simple, efficient, and compact plant designed for the sole purpose of producing a high grade sand for the plaster and masonry trade. The plant has a capacity of 160 cu. yd. per 8 hr., and all the material is trucked to points of use by trucks owned and operated by Mr. Jones.

The plant comprises a plate feeder serving a 40 ft. long belt conveyor that delivers to a 3- x 6-ft. Pioneer single-deck screen which is driven from the head pulley of the belt conveyor serving it. The plate feeder is driven off the tail pulley of the belt conveyor. Plus material falls to a truck and is discarded or sold for fill. Minus ⅛-in. flows to a 4-spigot Eagle Iron Works water scalper equipped with automatic discharge valves. Only one valve is used. This spigot unloads to a 24-in. by 18-ft. long weir, Eagle de-watering screw with the finished sand falling to a 40 ft. long stacker belt for ground storage. Both belt conveyors are driven by individual Allis-Chalmers gasoline engines through a long shaft that is above, and parallel to the belt conveyor and connects with the head pulley drive assembly. The gas engine is located above and near the toe of the belt conveyor. This novel type of drive is a Pioneer development and has proven very satisfactory. The Eagle sand screw is driven by an International gasoline engine. Water for the operation is obtained from a 4-in. pump, driven by a Wisconsin gas unit.

Loading in the pit is done with a 1½-cu. yd. Type HM Hough Payloader with a ¾-cu. yd. Type HF Hough unit for reclaiming to trucks. The company has eight trucks in delivery service and no railroad serves the plant. Most of the trucks are International with one General Motors unit.

The deposit being mined is immediately alongside the plant. R. Jones acts as plant superintendent and with his brother-in-law, W. H. Knipple, the two men operate the entire lay-out from pit to stockpile. Norman Jones looks after the delivery end of the business.

One advantage of a plant of this type is that it can be moved easily. At the time of inspection the plant had been in operation nine months. The office of Lester E. Jones is at 1315 Sante Fe Drive, Denver, Colo., and the plant is located at 60th and Colorado Blvd.

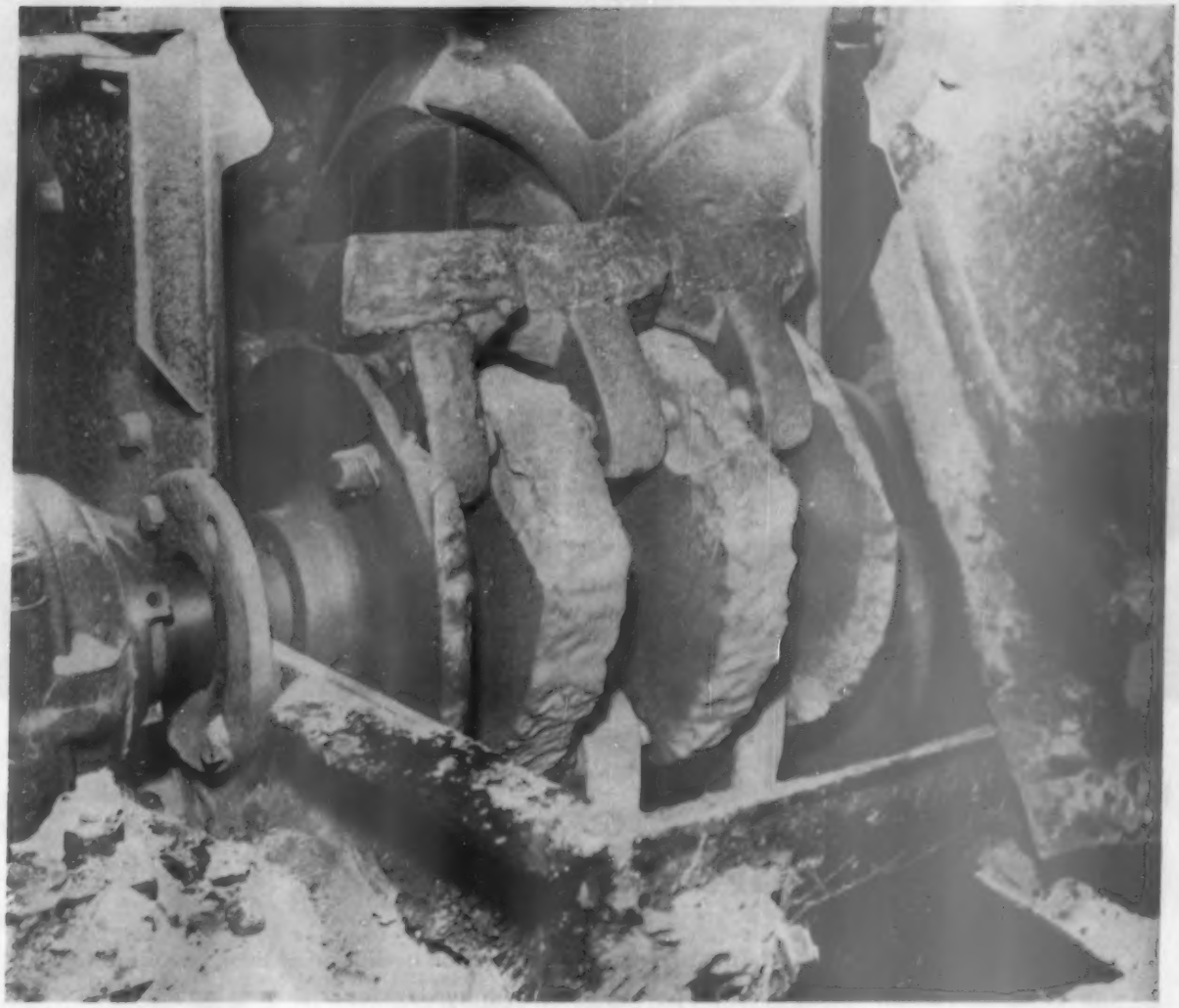
Loading sand in pit for haulage to the plant for processing

State Gypsum Rights

A bill, legalizing sale of gypsum rights on state-owned lands, has been passed by the Indiana State House of Representatives. The measure legalizes previously signed contracts between the State Conservation Department and three gypsum producing counties for gypsum rights in 1300 acres of Martin County State Forest land.

Canadian Cement

Cement production in Canada increased to 22,584,023 bbl. in 1954, from 22,419,912 bbl. in 1953, according to the Dominion Bureau of Statistics.



The periphery of the hammer mill rotor discs pictured here is regularly maintained with Coated Tube Stoodite, a high alloy electrode providing extreme wear resistance.

HOW TO GET MORE FROM YOUR HAMMER MILLS

Crushing decomposed rock and clay to produce material for wet-finished brick is a rough job and mighty tough on mill hammers. The Chattahoochee Brick Company in Chattahoochee, Georgia, has established a maintenance procedure that is producing more material at considerably lower cost by the use of Stoody alloys.

The raw material is dry-crushed in a pair of double rotor hammer mills. The problem, as usual, is to maintain the corners on hammers and keep them out to size as long as possible. The corners and edges of the hammer are, of course, subjected to severe impact and abrasion. At Chattahoochee Brick Company *new* manganese hammers are capped with an overlay of Stoody 21. As corners become rounded and the efficiency of the mill drops off, the hammers are pulled and turned over to the weldor for rebuilding.

Worn hammers as shown in the illustration are brought back to size with Stoody Manganese and the entire wearing area is hard-faced with Stoody 21. Records show that some hammers have been rebuilt and returned to service as much as 20 times. Thus the hard-facing program shows a remarkable saving in replacements as well as in downtime, and produces a greater volume of usable, properly sized particles.

Your Stoody dealer would be glad to advise you on the maintenance of your crushers and other heavy equipment subject to costly wear. Check the yellow pages of your telephone book or write to the company for complete descriptive literature.

STOODY COMPANY
11929 East Slauson Avenue
Whittier, California

A 10-ton hydrating plant adjoining a battery of mixed feed kilns at Ampsin, Belgium

Increase Efficiency In

Hydration of Lime

By N. V. S. KNIBBS* AND E. G. S. THYER*

• First of a series of articles on hydration of lime, covering theory and properties of calcium hydroxides

CALCIUM OXIDE combines with liquid water to produce the dry hydroxide with a liberation of 497 B.t.u.'s per lb. of CaO. The reaction is reversible but the hydroxide does not decompose below a temperature of about 700 deg. F. in air. The temperature at which the dissociation pressure is one atmosphere (that is, the temperature of dissociation in an atmosphere of steam) is a little uncertain. Several investigators have obtained figures ranging around 950 deg. F., but the most carefully carried out work, that of Johnston, found it to be 1017 deg. F. If the lime is dolomitic there is still more uncertainty in the data. Widely varying figures have been given for the heat of hydration of MgO, the best available, that of Roth and Chall, being 365 B.t.u.'s per lb. MgO. The rates of hydration and dehydration of magnesia are so low near the equilibrium temperature that there is the greatest uncertainty about that figure, which has been given as 374 deg. F. by Johnston and 626 deg. F. by Hüttig and Frankenstein. The heating curve method applied to a fully hydrated dolomitic hydrate gives a still higher temperature.

The hydration reaction, being one between a fluid (water or steam) and a solid, can take place only at the exposed surface of the latter. If lime were normally non-porous the reaction would be slow, as it is if the lime is fused or sintered, or is in the form of the large crystals which may be made by fusing calcium nitrate. The porosity of lime depends upon the temperature of calcination as well as upon the porosity of the carbonate from which it is produced, and the surface area exposed, and its reactivity, varies similarly, but much more. Much work has been done on the effect of temperature and time of burning on the hydration properties of lime, but most of it of little value. Later investigations have shown that the time and temperature to which lime is exposed have a much less effect on properties than the temperature of the $CaO/CaCO_3$ interface at the time of dissociation.

Lime produced in almost any kind of commercial kiln is very far from being a uniform product. Different pieces have very different rates of hydration. Moreover, any one piece of lime—a lump from a shaft kiln or a pebble from a rotary kiln—is itself very far from being homogeneous. There are points or surfaces of high activity in its internal surface which adsorb water instantaneously, producing a practically instantaneous rise of temperature. This is shown by following the evolution of heat on adding water to lime. Many limes give curves like "I" in Fig. 1, the rapid rise of temperature from "A" to "B" being due to highly reactive surface. Once

(Continued on page 88)

*Knibbs & Thyer, consulting engineers, Longfield, Kent, England.

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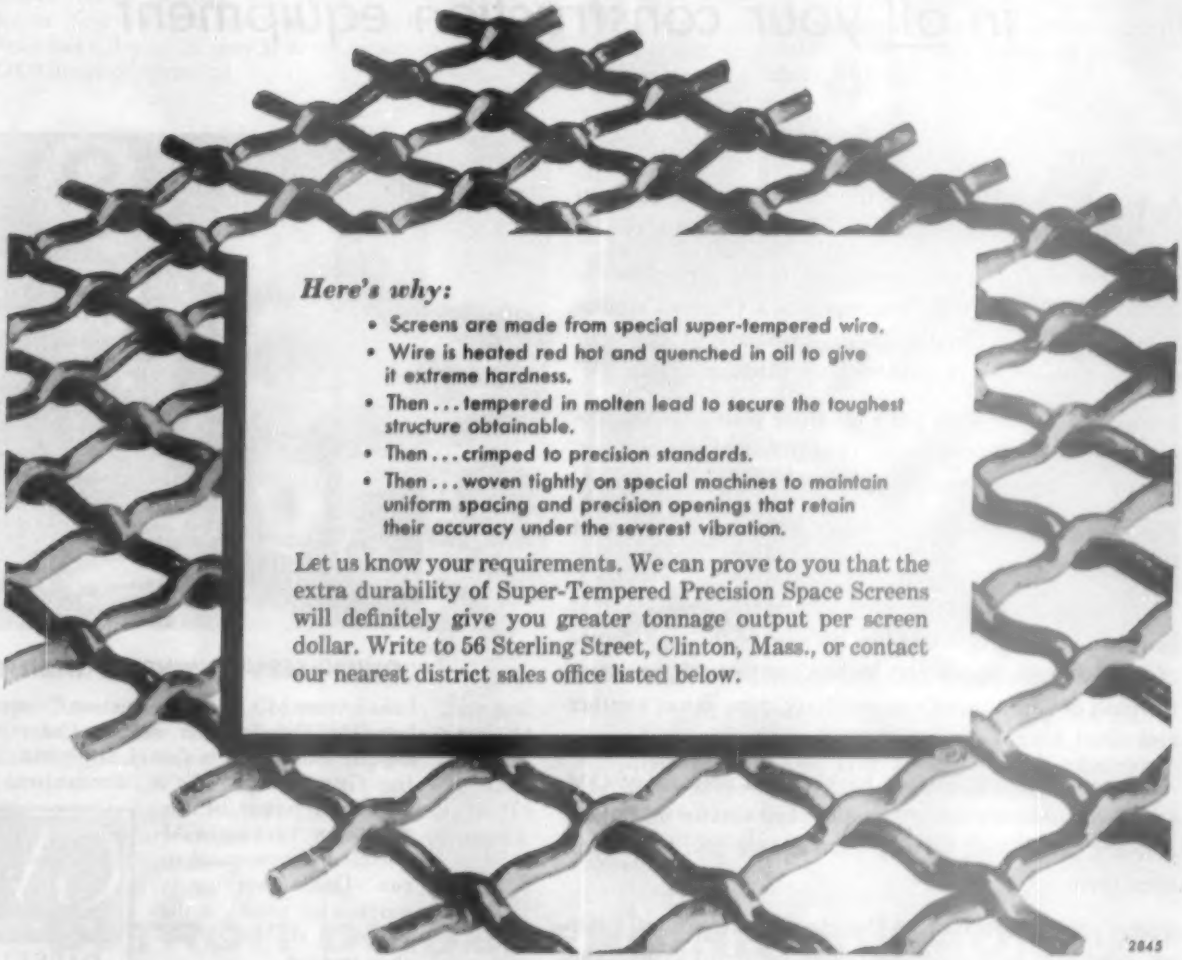

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"QUICK SERVICE WHEN I NEED IT"

Iowa's Gene McClain Construction Company has GM Diesel power in this Cedarapids asphalt plant and in a shovel. Superintendent Jim Grundy says, "We've standardized on GM Diesel power for this operation because GM Diesels are economical to run. Dealer service is quick and good . . . the company stands behind their product."

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And that's big production for a ¾-yard dragline. This GM Diesel-powered Unit has been working for Michigan contractors, Henry Schmid Sons, since 1946. Its General Motors 2-cycle Diesel burns about 12 gallons of 14.9¢ Diesel fuel a day—cost only $100 for repairs in more than 17,000 hours of operation.

MULTIMILLION-DOLLAR DEPENDABILITY

Faced with wet footings on this multimillion-dollar sewage plant contract, Pittsburgh's Rust Engineering Company put GM Diesel-powered Jaeger dewatering pumps to work. Superintendent P. J. Pedone says, "The GM Diesel engines have proved very satisfactory . . . they're keeping footings dry so we can go ahead with the job."

3 GM UNITS ALMOST DOUBLE OUTPUT

Kansas' Reno Construction Company reports their new Cedarapids portable rock crusher with three new GM Diesels stepped up output from 200 tons per hr. to almost 400 tons. One "6-110" Diesel powers the primary 36" x 45" double impeller impact breaker; a GM Twin "6-71" powers the secondary and a "3-71" powers the conveyors, screen and feeders.

25% MORE WORK FROM GM DIESEL POWER

One of the best known excavating companies in Northern New Jersey and New York State is Raymond L. Cole Construction Co. "Our GM Diesel-powered American shovels do at least 25% more work than other Diesels in the same number of hours. They are more flexible," reports this user of one 1½- and three ¾-yard shovels . . . all GM powered.

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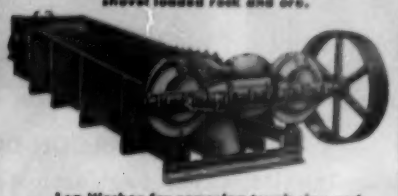
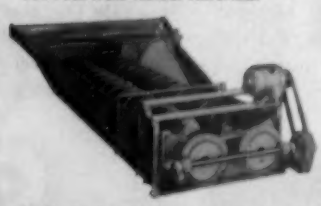
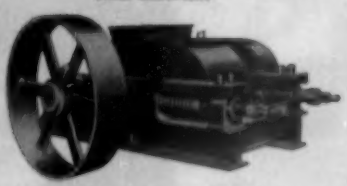
All Steel Rockmaster Single Roll Crusher for primary or secondary work on shovel loaded rock and ore.

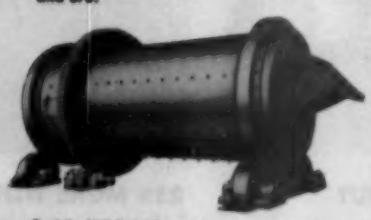
Heavy Duty Reciprocating Plate Feeder. Handles any materials from sand sizes to shovel loaded rock and ore.


Log Washer for removing tough clay and soft rock from various materials.


Double Screw Washer (with gear cover removed), for dewatering, desilfying and removing waste from sand, limestone and other materials.


Heavy Duty Fabricated Steel Double Roll Crusher for secondary reduction of rock and ore.

Double duty combination Scrubber and Sizing Screen for large and small capacities.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Hydration of Lime

(Continued from page 84)

this surface has adsorbed all the water molecules it can accommodate, the rate of rise of temperature is greatly reduced until, at about "C", the true hydration reaction begins, increases, and then tails off again. The surface activity to which the initial rise of temperature is due is easily lost by exposure of the lime to moisture and to carbon dioxide, and in ordinary kilns, where the lime is cooled by the air required for combustion, there is necessarily some loss of initial reactivity by adsorption of the moisture in that air. Of still more effect is the adsorption of carbon dioxide in the kiln, due to exposure of the lime to gases containing CO_2 in the cooling zone of the kiln. The water or carbon dioxide or both are taken up on the highly reactive surfaces and, in the worst instances, all the initial activity is lost, the hydration curve being like "II" in Fig. 1. The loss of this initial reactivity greatly retards the onset of true hydration so that the rise at "C" comes much later and the slope of the curve thereafter is less steep. The complete loss of initial activity is unusual and a more typical effect of the normal exposure which a lime receives in a kiln is shown by "III."

The exact mechanism of hydration has not yet been satisfactorily explained, and its investigation is difficult. The profound differences between hydration by liquid water and water vapor may be ascribed to the much greater concentration of water molecules in the former, and to the dispersive effect of water, but the hydration reaction seems to follow a different course and it has been suggested (in Sweden by Hedin and Thorén) that calcium oxide dissolves in water before it hydrates. It has also been found (at the National Building Research Institute in South Africa) that the magnesia in some dolomitic limes can be hydrated in the presence of liquid water at elevated pressure and temperature, but not by superheated

(Continued on page 92)

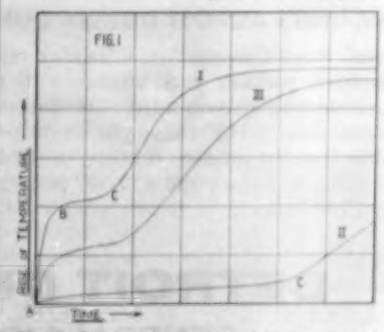

Fig. 1: Rate of hydration of lime in liquid water

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Lewis, North Carolina

November 17, 1954

Screen Equipment Co., Inc.
1754 Walden Avenue
Buffalo 25, N. Y.

Attention: Mr. Fielding

Dear Mr. Fielding:

We thought you might like to know the figures involved in our West Virginia Turnpike job on which we used two SECO screens.

We crushed over 750,000 tons of stone that was fed to the SECO screens as 8" material and our finished product was 2" material.

We operated 10 hours a day, six days a week, and experienced no down time due to screen trouble with SECO while 6000 tons per day was screened.

We were extremely pleased with the trouble-free service given by SECO.

Looking forward to seeing you in Kentucky, I remain

Very truly yours,

C. E. Clement
C. E. Clement

CEC:mrc

AFTER ALL . . . IT'S PERFORMANCE THAT COUNTS . . . and

Clement Bros. Meet W. Virginia Turnpike Specs. For 2" Stone in Record Time!

Photograph of Clement Bros. plant taken on-the-job

THOSE rugged, dependable SECO'S keep proving themselves when the going is toughest. As on this job for Clement Bros. fast, trouble-free screening of large tonnages accurately sized was the order of the day . . . six days a week for five months . . . and SECO delivered without a letdown.

SECO

TRUE CIRCULAR ACTION

VIBRATING SCREENS

Screen Better With SECO'S On Your Job

Whether you're screening heavy or light, moist or sticky materials, there's a right SECO for your job. Over 350 models in single, double, triple and 3½ deck designs.

Send for Catalog No. 204 today!

SCREEN EQUIPMENT CO., INC.

BUFFALO 25, NEW YORK

Hats Off To The New West Virginia Turnpike

88 miles of brilliantly engineered and superbly constructed superhighway. Extends from Charleston, West Virginia's capital city, to Princeton at the Virginia border.

YOU CAN'T BEAT SECO FOR TROUBLEFREE PERFORMANCE

Pangborn Dust Control

Saves $14,000 a year for Woodall

The Long Island plant of Woodall Industries, Inc., had a serious problem. Fabricating Masonite for its hundreds of products released so much dust that, without efficient dust control, work would be practically impossible. So Woodall installed a Pangborn Dust Control system.

The result? The dust collected not only leaves the plant dust-free but provides *all* the fuel for heating and processing requirements. Savings on fuel bills amount to $14,000 a year! Pangborn Dust Control at Woodall pays its own way *with a profit* for the firm.

Pangborn can solve *your* dust problem. Pangborn engineers will be glad to show you how Pangborn Wet or Dry Dust Collectors can save you time, trouble and money!

See how Pangborn benefits varied industries. Write for free copy of "Out of the Realm of Dust." Pangborn Corp., 4300 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn CONTROLS DUST

Hydration of Lime

(Continued from page 88)

steam at the same temperature. The Swedish investigators found that on hydration of water vapor, lime burned at a low temperature, with little shrinkage, follows a curve like "I" in Fig. 2 and they ascribe the increased rate of

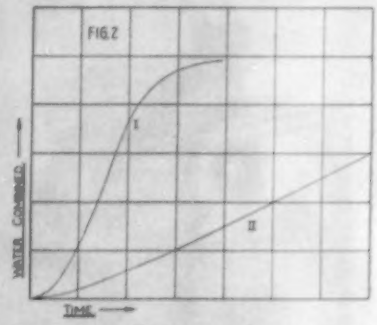

Fig. 2: Rate of hydration of lime in water vapor

hydration to the exposure of new internal surfaces by a widening of the gaps between crystal units due to hydration at the exposed portion of these gaps. Lime which has been considerably shrunk in calcination they found to follow curve "II" in Fig. 2 and they ascribe the constant rate to a lack of internal surface. The reasons suggested to account for the observed facts, however, do not seem to be in accord with other phenomena. Lightly burned lime can be completely hydrated by water vapor at elevated temperature without increase of volume or disintegration of the structure, whereas lime which is shrunk in burning invariably disintegrates. The opening-up of the gaps would inevitably increase the volume and presumably disintegrate the solid. The non-expansive hydration of lime may become a serious problem in the ordinary hydration reaction, if the lime is of very high reactivity. It results in the production of coarse hydrate which is rejected by the air separating system although chemically it may be superior to the finely divided hydrate.

The rate of hydration of calcium oxide in the presence of liquid water increases rapidly with increase of temperature. Precise data are lacking but such information as there is available suggests that the rate roughly doubles for each 20 deg. F. increase of temperature. At atmospheric pressure, the limit of temperature is necessarily 212 deg. F. but, if the doubling for each 20 deg. F. holds good, an increase of pressure of only 7 lb. per sq. in. will double the rate, and the rate at 50 lb. will be nearly 20 and at 100 lb. nearly 80 times the rate at 212 deg. F.

Furthermore, there are differences

(Continued on page 94)

CAFLISCH BUILDERS PICKED ERIE STRAYER TRUCK MIXER PLANT TO SERVE RURAL AREA WITH SPECIFICATION CONCRETE

Just one man is needed to run Caflisch Builders' Supply's Erie Plant. Equipment includes GTES 100-yd. Bin with EWEH 5-yd. AggreMeter, and 50-TPH Cement Elevators.

RECENTLY Caflisch Builders' Supply, Union City, Pa., went into the ready-mix business. Their success depended on delivery of top grade specification concrete to any point in a 15-mile rural area—fast and at reasonable prices.

To carry out this new venture, the Caflisch people bought an Erie Portable Truck Mixer Plant. After several months operation, here's what president Les Caflisch says about his Erie plant:

"We're really selling lots of concrete with our 'Johnny-on-the-Spot' service at down to earth prices. Our specification concrete meets the demands of highway officials and building contractors. Farmers who used to mix their own, just can't afford to in view of what we can do for the small user. We're pleased with our Erie Plant, with the fine concrete it produces, and with its low cost operation."

Mr. Caflisch's views are shared by hundreds of our customers. Erie Strayer's big Central Mixing Plants are famous for their ability to deliver without breaking down. The same fine engineering makes the Erie Portable a "best buy" for the smaller operators. Here are three reasons why:

1. One-man operation provides efficient, profitable production.
2. Welded sections. Can be assembled in eight hours. Knocks down just as fast—into parts that can be handled easily on low bay trailer.
3. Built to last—but with all standard parts for easy replacement.

For literature, write Dept. P-65
Cable Address: EXIMPORT

ERIE STRAYER COMPANY

465 GEIST RD. ERIE, PENNSYLVANIA

Hydration of Lime

(Continued from page 92)

which may seem to lie not merely in the speed of hydration. Some impure overburned limes appear to remain unreacted after being in contact with water for many months or even years, and even at 212 deg. F. the rate of hydration may be immeasurably slow. Yet these same limes, at elevated pressures, may be hydrated readily. Also the magnesia in a dolomitic lime may remain partly or wholly unhydrated for an indefinite period yet, under pressure, it may be hydrated at a speed suitable for industrial purposes.

The mechanism of hydration in excess of water to produce a putty, cream or milk is also somewhat obscure. When slaking was carried out by hand two phenomena had to be avoided: "burning" and "drowning." Both resulted in an unsatisfactory product, the putty being lumpy or gritty and the volume yield, from a given weight of lime, being reduced. "Burning" is due to adding insufficient water to the lime, or, more often, to inadequate stirring so that parts of the lime are deficient in water, with resulting high temperature. "Drowning," on the other hand, is due to too much water which retards hydration by keeping the temperature low. The troubles arising from both these phenomena are due to partial non-expansive hydration. Apart from yielding a gritty or lumpy product, non-expansive hydration is generally incomplete, because of the difficulty the water molecules have in penetrating the hydrated external layers of the particles.

Properties of Hydrated Lime

Hydrated lime, when it mainly consists of calcium hydroxide, varies in its properties from that of a highly dispersed gel to a crystalline powder, or even, if specially prepared, to large crystals. When it is prepared from a magnesian lime, the magnesia or magnesium hydroxide which it contains confers a still wider range of properties. The extraordinary difference between the lime putty or cream produced by slaking in excess of water, and the product of steam hydration or of hydration with no more than enough water to produce the hydroxide, made early investigators suspect the existence of a series of hydrates of calcium hydroxide, but their existence has been disproved. Water is held by the hydroxide, but it is adsorbed, not chemically combined, and the difference of properties must be due to the form of the hydroxide and especially the surface area it exposes, and to hydrogel formation.

Lime putty, when made from a pure high-calcium lime by slaking in excess water, is a highly plastic material. It retains its form without slumping, yet is easily spread over a porous surface, and it holds its water against the suction of that surface for a period sufficiently long to allow easy spreading by the plasterer or mason. This wet-slaked putty, at the consistency at which it is used, contains a large amount of water—as much as two and a half times the weight of the calcium hydroxide—and consequently, on drying, there is high shrinkage, with its attendant disadvantages. If the same lime is hydrated to a dry hydrate and the latter is mixed with water to form a putty of the same consistency the plasticity or workability and the water-retaining power of the putty are much less than those of the wet-slaked putty, but it contains much less water (often about 100 percent) and consequently shrinks much less on drying.

The fortuitous occurrence in Ohio of dolomite which, when burned and hydrated, yields a product that attains high workability and water retention on soaking, was instrumental in rapidly increasing the use of hydrated lime in the building industry in America. It also resulted in an unwillingness by plasterers (and to a lesser extent of masons) to use hydrated lime that is less plastic, and consequently in the attempt to produce plastic hydrate from high-calcium lime and also from other dolomitic limes. Although many claims have been made to produce such plastic hydrates from high-calcium limes the degree of commercial success attained has been limited.

The causes of plasticity in dry hydrated limes is still only partially understood. In high-calcium limes, plasticity may be attained in two ways: by producing hydrate particles which, on soaking in water, adsorb water in the same way as those in a lime slaked in excess of water, and by altering the shape of the particles, probably making them plate-like. The former kind of hydrate can be made by drying a pure lime putty at a low temperature; for example, in a spray dryer, and the latter kind by ball-milling a hydrate. Unfortunately, the drying of a putty is a costly undertaking and, apart from this disadvantage, the hydrate produced tends to require a large volume of water to form a putty, with consequent high shrinkage on drying. Ball-milling of hydrate reduces the water in the standard putty as well as giving plasticity and water retention, but due to the fineness of hydrate particles and the "stickiness" of the milled product, there are formidable technical difficulties in attaining useful results.

Magnesian limes, when lightly burned, are rapidly plasticised by ball-milling, and when the magnesia is partly or wholly hydrated the magnesium hydroxide may confer plasticity and water retention without milling, though here, again, much depends on the nature of the original dolomite and its calcination. Probably there is a great deal of information on this subject that is not made public by the dolomitic lime companies.

The properties of dry hydrated lime, and also of the wet hydrate, are greatly modified by small amounts of impurities or additives, and there have been innumerable patents covering such additions, the majority of which claim either an increase of plasticity or to confer rapid-hardening properties. Most of the additions which are effective in modifying properties in the way claimed are undesirable for other reasons.

Water and carbon dioxide may each be taken up by hydrated lime either adventitiously or by design. The presence of free water in hydrate influences its "flow" and other such properties in the expected manner, though different limes can hold different amounts while retaining sufficient "flow" for the operation of bagging through a valve. For example, hydrated lime containing as much as 5 percent free water has been pumped into sacks without undue difficulty, but most hydrates will not hold much more than 2 percent without becoming "sticky." Free water in hydrate has a profound effect in facilitating the attainment of plasticity by ball-milling, but as it also greatly enhances the tendency of the material to stick to the grinding surfaces it is not of much practical value.

The effect of carbon dioxide in modifying the properties of hydrated lime was being investigated for the National Lime Association before the war, the investigations being left unfinished. If the hydrate is dry, the carbon dioxide is said to be adsorbed, not combined as carbonate, and the product has a lower bulk density, increased volume when settled from water suspension, and decreased "flow" in the dry state. Furthermore, Minnick (U.S.P. 2,453,637) found that such adsorbed carbon dioxide, even in amounts as low as 0.1 percent, greatly affected the properties of the putty formed by mixing with water, due to the coating of the hydrate with highly thixotropic carbonate. Carbonate in hydrate also influences the hardening of mortar made from it, but this

(Continued on page 134)

AN IMPORTANT MESSAGE CONCERNING...

A Basic Advance In Motor Insulation

ELECTRIC motor and generator insulation has come in for its share of announcements of "new" and "revolutionary" developments. But in spite of these announcements, inherent shortcomings of conventional insulation have remained.

There has been little basic improvement in motor insulating systems . . . UNTIL NOW.

Allis-Chalmers, working with engineers and scientists of Dow Corning Corporation, has developed *Silco-Flex* motor insulation . . . truly new in concept . . . truly new in effectiveness.

The *Silco-Flex* insulation system employs a pure silicone rubber combined with specially developed application techniques to produce an insulation unmatched by any other in use today. Outstanding improvements are shown in all these important characteristics:

Homogeneity — The complete *Silco-Flex* coil insulation is vulcanized into a single piece with no joints, voids or splices which can develop into breaks in the insulation. Even the best of the new conventional insulations combine several dissimilar materials which are held together by binders.

Heat Resistance — The excellent dielectric and mechanical properties in silicone rubber do not change significantly with aging at high temperatures over long periods of time.

Moisture Resistance — Completely sealed, *Silco-Flex* insulated coils are the most moisture-resistant coils ever produced.

Chemical Inertness — *Silco-Flex* insulation has outstanding resistance to most atmospheric contaminants, corona and weathering. It also withstands weak acids, alkalies and lubricants.

Flexibility and Resilience — *Silco-Flex* insulation remains flexible and resilient indefinitely under operating conditions. It is especially resistant to mechanical abuse and to the stresses brought about by overloading and rapid starting and stopping. It is also amazingly resistant to abrasion.

Heat Dissipation — Most electric insulators, unfortunately, are also heat insulators. *Silco-Flex* insulation, by comparison, is an excellent heat conductor and materially assists in removing heat from the coils.

What Are the Benefits?

The characteristics of this new insulation are so remarkable that complete reappraisal of motor application practices and motor performance is indicated.

In *all* applications, the chemical, mechanical and electrical properties of *Silco-Flex* insulation insure increased service reliability and longer life.

In addition, this new insulation system may reduce or eliminate the need for special motor enclosures. Atmospheres contaminated with cinders and fly ash, for instance, will have little effect on *Silco-Flex* insulated windings. Similarly, abrasive dusts in steel mills will not harm this insulation. Savings through the use of open, instead of totally-enclosed, frames will also be possible in chemical, paper, food and other industries where water or corrosive atmospheres are a problem.

What About Availability?

New *Silco-Flex* insulation is immediately available for all Class H form-wound coils and for Class A and B windings. operating under selected service conditions.

For complete information on SILCO-FLEX insulated motors, see your Allis-Chalmers representative or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4664

Silco-Flex is an Allis-Chalmers trademark.

ALLIS-CHALMERS

Photograph of shot consisting of 36,000 lb. of explosive in 59 blast holes. Four rows were detonated

• Maumee Collieries Co., large coal operator, develops economical blasting method involving making cartridges at plant. Product undergoing tests in crushed stone quarries

By BROR NORDBERG

New Method of BLASTING With Ammonium Nitrate

AKREMITE is the name of a patented method of blasting developed by Maumee Collieries Co., a large Southern Indiana strip-mine coal operator. The patent covers a new theory of blasting, utilizing ammonium nitrate as the principal explosive, a unique method of packaging the explosive mixture and certain other features.

Akremite is the result of a long-time experimental program to develop a system of blast-hole shooting using inexpensive agents, that might be prepared on the property and thus minimize transportation costs as they apply to fixed explosives.

Coal deposits occur in veins of the order of three feet thick on the company's properties and they are covered with heavy overburden consisting of sandstone, limestone and hard shales.

These layers of stone occur in inconsistent strata and much of it is abrasive and tough. Thicknesses range from 30 to 65 ft., and average 50 to 60 ft. The company must remove some 30 million cu. yd. of material annually.

Based on successful experience by Maumee, the new method of blasting is being licensed to other coal producers and it is said to be adaptable to commercial quarrying. Presently, it is undergoing exhaustive tests on a commercial scale in a large mid-western crushed stone plant.

Preparing Explosive

Ammonium nitrate explosives are, of course, not new but Maumee's method has been devised for the purpose of more fully utilizing the known explosive potential of the material. The method is based on a mixture of ammonium nitrate with oxidizable material, together with a specially-developed cap-sensitive primary charge. A patent has been applied for, covering the preparation and use of the primer charge, which will be licensed to explosives' manufacturers.

The method of packaging the explosive as done at one of the mines is of special interest. Commercial grade ammonium nitrate is shipped to the plant in 100-lb. polyethylene bags from the Spencer Chemical Co., Kansas City, Mo.

The ammonium nitrate is mixed with a small percentage of finely divided carbon black of high grade. The two materials are proportioned by weight into a simple mixing drum or tumbler, the mixture is dumped via skip bucket into a hopper from which a weighed amount is released into polyethylene bags.

The bags are fabricated at the plant and they are simply and quickly made. Polyethylene, which is highly resistant to water and transparent, comes in a 14-in. wide roll. The operator cuts the material to the proper length and tightly closes one end with a copper wire tie to form a cylindrical bag. When filled with the explosive mixture and similarly tied at the top by wire, the cartridge is ready to use.

Maumee is using 10⅝-in. vertical blast holes, and cartridges for that ap-

One of the large draglines for removal of overburden consisting largely of blasted stone

Michiana Turnpike Gravel Co., Coldwater, Mich., is turning out a fabulous quantity of concrete aggregate at their Ray, Indiana, plant—material that meets stiff Indiana state "spec." Eagle supplied the washing-classifying-dehydrating equipment that is mastering this turnpike contract. It consists of a 16' single water scalping-classifying tank in combination with a 36" dia. x 25' fine material, long weir screw unit producing fine mesh material. Three 24" dia. x 18' coarse material washer-dewaterers, each handling a different gradation of smaller gravel and a 30' log washer to process large gravel.

Aggregate for "million dollars a mile" toll roads just has to be right . . . as Eagles always produce it; safely and economically. Nothing takes the place of experience—Eagle has it. Harold F. Stukey, owner, also has the experience to make the most of a productive plant like this.

SEND FOR CATALOG 55.

The Eagle Water Scalping-Classifying Tank and Screw Unit which is producing "mountains" of clean, fine mesh material for concrete that will last under tomorrow's loads.

Three Eagle Single Screw coarse material units each process a different gradation of coarse meshes in this "turnpike master" set-up.

EAGLE IRON WORKS
137 HOLCOMB AVENUE
DES MOINES, IOWA
EXPERIENCE-PROGRESS-
SERVICE SINCE 1872

EAGLE IRON WORKS

Size of rotary drill is evident from comparison with automobile. Powder wagon follows behind rotary drill to load holes

plication measure 9-in. diameter by 27 in., holding 50 lb. of explosive. Cartridges can be made to smaller or larger sizes. The cap-sensitive primary charge is packed in 20-lb. polyethylene bags by the Austin Powder Co. according to the company's specifications.

Cartridges are delivered from the packaging plant to the several mines. They are transported to the blasting site in small powder wagons. Polyethlyene has sufficient strength that the cartridges may be safely dropped the full length of a blast hole. It has the characteristic of stretching so that the cartridge will swell to larger diameter upon impact in the blast hole. Thus the charge will completely fill the cross-section of the blast hole, which is considered important for optimum explosive effect. Velocity of the explosive is 12,000 to 14,000 ft./sec. which is higher than for conventional extra ammonin dynamites.

Production of the blasting agent is considered non-hazardous since the ingredients involved and the mixing and packaging are of non cap-sensitive methods. The company thus far has shot more than eight million pounds of Akremite without a single missed hole but any unshot explosive would not be a hazard in digging.

Drilling — Blasting

Practices in the use of detonators, detonating fuse, connections and millisecond delays are the same as they were with fixed explosives in the company's mines. There is no limit to the number of holes that may be charged as drilled since the cartridges are stable and moisture-resistant. Practice is to charge holes as they are drilled, directly following up the drilling machine.

Normal pattern at Maumee's plants is to drill four rows of blast holes paralleling the face, and to fire up to 60 holes per shot. A buffer area is left adjacent to the highwall, thus leaving about 75 ft. of bank to provide a moving area for large draglines and to keep broken stone out of the coal-working pit below.

Hole spacing averages 30 ft. between rows and 27 ft. apart, with the holes offset in every other row for a diamond pattern. Maximum breakage is the objective since excavation is by large capacity draglines.

Deck charges are the common practice and separate primers are then used for each deck. Stemming consists of drill cuttings and no tamping is required. Primacord and millisecond delays are employed and the shot is set off by caps through wiring to a push-down type of blasting machine. Yield averages from 4 to 4½ tons per lb. of explosive.

Photographs herewith were taken on an inspection trip to mines No. 20 and No. 27 where two blasts were observed using Akremite. The shot at Mine No. 27 was a 19-hole blast and the one at Mine No. 20 was a 59-hole blast with 36,000 lb. of explosive. In the one case a 1250-B Bucyrus-Erie walking dragline with 30-cu. yd. bucket is used for removal of blasted overburden and a 1150-B with 25-cu. yd. bucket is used at the other mine.

Drilling is by 50-R Bucyrus-Erie rotary dry-type drills with tri-cone oil well-type bits. Footage averages a little over 100 ft. per hr. of 10⅝-in. hole in drilling through hard dolomitic limestone, massive sandstone and hard sand shale.

Worker dropping 50-lb., 9-in. dia. cartridge into a 10⅝-in. dia. blast hole

Comparative tests have been run with other explosives and, according to company officials, have been very favorable with respect to costs and to quality of fragmentation as measured by overburden yardage moved and swing cycle time of the draglines.

The name "Akremite" was selected for the blasting method in honor of Robert Akre, drilling and blasting superintendent. Mr. Akre was co-developer with president Hugh B. Lee.

Arizona Resources

A SURVEY OF SELECTED NATURAL RESOURCES in Arizona has been compiled in book form by Arizona Research Consultants, Inc. The 85-page book lists the state counties, with descriptions of each natural resource presented under the county with the principal deposit. Such non-metallic minerals are included as bentonite, clay, graphite, asbestos, fluorspar, silica, scoria, pumice, barite, lithium minerals, mica, feldspar, diatomaceous earth, perlite, gypsum, calcite, limestone, dolomite, cement, pumicite, talc, etc. The 85-page book lists mineral uses, mining and processing methods, and markets and prices. The "Arizona Development Board Report on Selected Natural Resources," is published by Arizona Research Consultants, Inc., 3802 North 14th Place, Phoenix, Ariz.

Agstone Licensing Bill

A BILL, providing for the licensing and inspection of agricultural limestone, has been brought up in the Michigan State Senate. The bill would require producers, importers or sellers of agstone to file a sample and analysis of the material with the director of agriculture, and label containers as to weight, content, minimum percentages of calcium and magnesium, total neutralizing value, degree of fineness, and the name of the producer. A license fee of $20 would be paid to the department of agriculture for each brand of liming material sold in Michigan.

Buys Four Gypsum Ships

NATIONAL GYPSUM CO., Buffalo, N. Y., has ordered four freighters from two West German shipyards. The Nordseewerke Emden of Emden, Germany, is building two 15,000-ton 4500-hp. gypsum carriers for the firm, and Deutsche Werft AG of Hamburg, Germany, is building two 10,600-ton carriers, equipped with 3000-hp. turbine machinery.

2¼-yd. MICHIGAN 175A carrying full load low up a grade . . .

This big POWERHOUSE handles bigger jobs cheaper!

Check the specs of the MICHIGAN* 175A:

BUCKET CAPACITY.....2¼ yds.
WEIGHT.....24,100 lbs.
LIFTING CAPACITY.....15,000 lbs.
SPEED..Up to 27 mph, Forward and Reverse
HORSEPOWER.....133 Diesel, 126 Gas, 165 Supercharged

Don't look for "comparative" data on the MICHIGAN 175A—there is *no machine comparable*. This big bruiser is nearly 50% bigger than the next closest machine on the market. From flywheel to bucket, the 175A is built to do bigger, heavier jobs—jobs that no other rubber-tired machine can handle.

Better traction and flotation With the MICHIGAN's exclusive power train—300% torque multiplication, power shift transmission (no engine clutch) and planetary wheel axles—you get a shockless flow of power right down to the ground. There's no surge, no wind-up in the axle shaft, no wild wheel-spin. The operator has feather-touch control over his wheels; in weak soil conditions or mud, he can ease off or step up the power to keep from digging in. With this kind of smooth power transmission, you get the full advantage of the MICHIGAN's extra weight and power—you dig material *out*, you don't dig the machine *in*.

Hydraulic power does the work In spite of its size and power, the MICHIGAN 175A is easier to operate than most machines one-third its size. Hydraulic power does all the real work: power steering, 4-wheel power brakes, power-shifting with two simple levers on the steering column, no clutch pedal.

See it in action! We'll prove that the MICHIGAN is in a class by itself in the Tractor Shovel field: your local MICHIGAN distributor will arrange a demonstration—on your own job, if you wish. Or write for 12-page Tractor Shovel booklet containing explanation and cutaway drawings of the MICHIGAN power train. Any MICHIGAN is available on a low-cost Lease Plan—ask for brochure which explains how you can use it.

CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
452 Second Street
Benton Harbor 30, Michigan
Phone WA 6-6184

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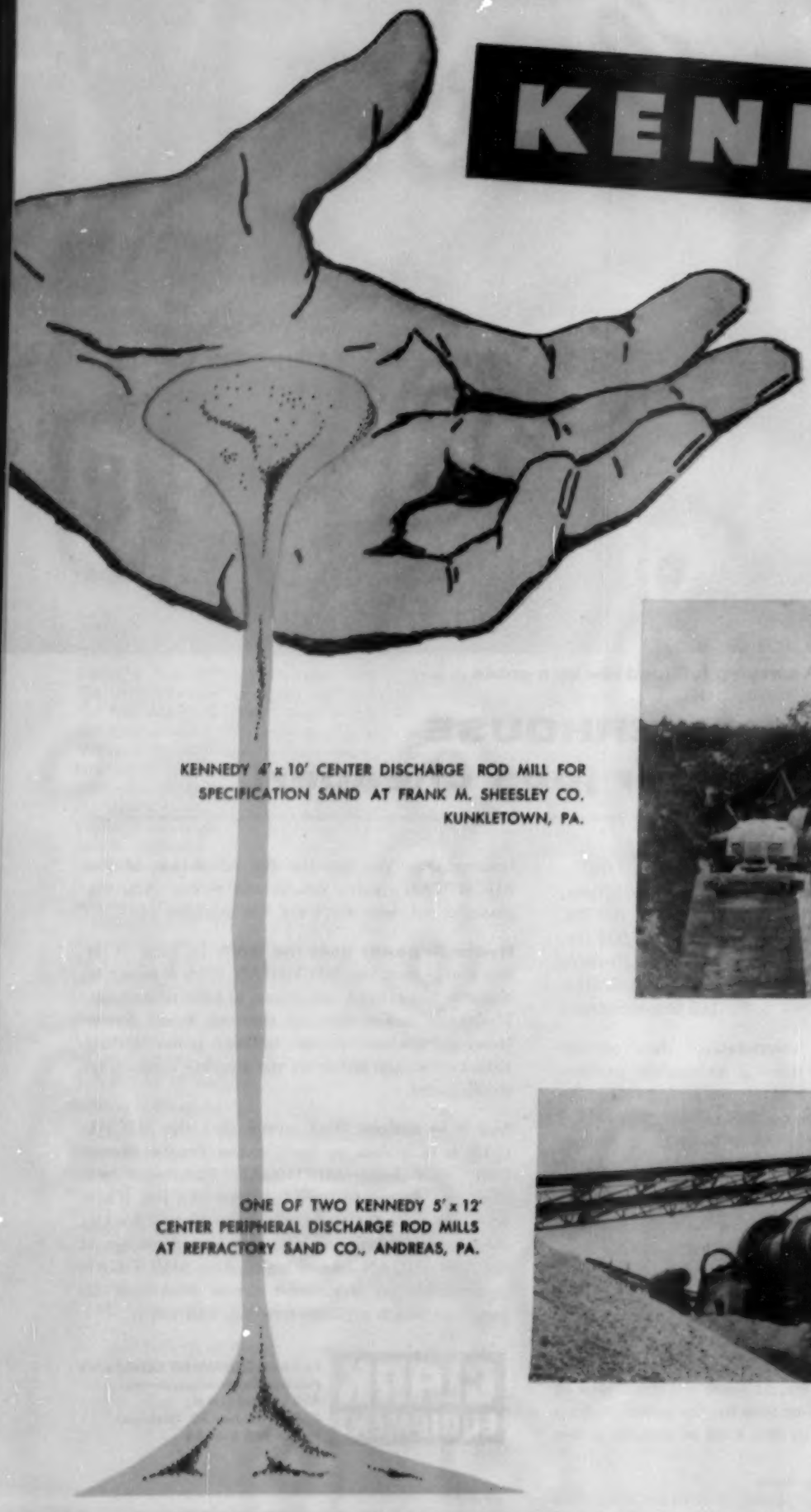
KENNEDY



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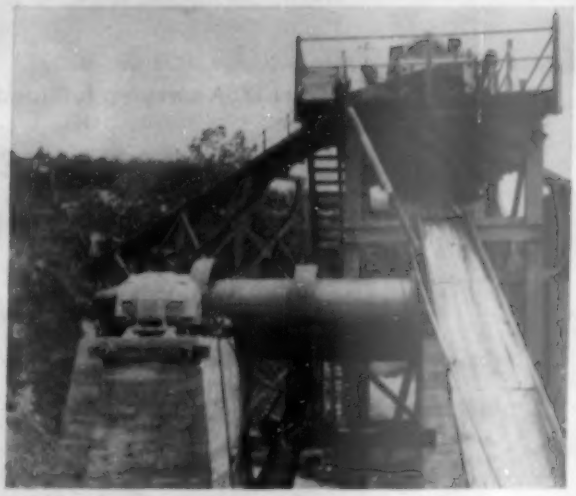


KENNEDY 4' x 10' CENTER DISCHARGE ROD MILL FOR SPECIFICATION SAND AT FRANK M. SHEESLEY CO. KUNKLETOWN, PA.

ONE OF TWO KENNEDY 5' x 12' CENTER PERIPHERAL DISCHARGE ROD MILLS AT REFRACTORY SAND CO., ANDREAS, PA.

- ROD - MILLS

.....low maintenance and exact specifications

in manufacture of SAND

See what Mr. Neal McMullen, manager of Frank M. Sheesley Co. reports on KVS Rod Mills:

"We are one of the very few Companies in our area capable of making sand to the rigid Turnpike specifications. Our KENNEDY Rod Mill is, in large measure, responsible for this ability to produce and hold gradation. We investigated thoroughly before buying and are now certain it pays to own the best."

KVS Rod Mills built to perform a specific, and important, function...producing a grade of sand to meet rigid specification. These mills not only meet these requirements, they continue to make sand of a *uniform grade*, economically and without costly maintenance.

Whether your pulverizing and grinding problems involve sand, cement, lime or coal, KVS has the equipment you need that is best suited for the job—

KVS sales-engineers are available for consultation anywhere—anytime!

Let us run a KVS Rod Mill test on your material.

WE'LL PROVE TO YOU THAT....

IT COSTS LESS TO OWN THE BEST!

SEND FOR BULLETINS DESCRIBING KVS MACHINERY AND EQUIPMENT.

KENNEDY-VAN SAUN

MANUFACTURING & ENGINEERING CORPORATION

TWO PARK AVENUE • NEW YORK 16, N. Y. • FACTORY: DANVILLE, PA.

New Study On Reactions In Burning Cement Raw Materials

By L. A. DAHL*

Part II: Tracing the course of crystallization

TO ILLUSTRATE THE MANNER IN WHICH THE NORMAL COURSE OF CRYSTALLIZATION† of a liquid in the system may be traced, let us consider liquid X, which is on the line CaO-R. Judging from the position of X with reference to the isotherms and the melting point of CaO (2570 deg.), we would estimate the temperature of complete fusion of X to be about 2350 deg., and will assume that to be the case. Solid CaO appears when liquid X is cooled just below 2350 deg., and increases in amount as the temperature is lowered. As the quantity of solid CaO increases the liquid changes in composition in a direction away from the CaO vertex. At 1700 deg. the liquid is at point R. Since the line CaO-X is one-fourth of the line CaO-R, the mixture consists of 25 percent liquid R and 75 percent solid CaO at 1700 deg.

As the mixture cools below 1700 deg. the liquid continues to change in composition in a direction directly away from CaO until at about 1550 deg. it arrives at T, which is on the boundary between the CaO and C_3S primary phase regions. It might seem that with a little further cooling the liquid would change in the same direction to a point inside the C_3S region, such as T_1. However, the only solid phase with which a liquid in the C_3S region can exist in equilibrium is C_3S. Movement of the liquid to T_1 would involve a decided change from a state in which the phases are solid CaO and liquid to one in which they are solid C_3S and liquid. The matter may be tested by drawing the line C_3S-T_1. Since X is not on the line C_3S-T_1, this is an impossible condition if equilibrium is to be continuously attained. On the other hand, the liquid might change in composition along the curve TD, and this possibility can be tested. Since V is on the boundary between the CaO and C_3S primary phase regions, and also on the 1500 deg. isotherm, liquid V may exist in equilibrium with CaO and C_3S at that temperature. Without drawing the necessary lines, it is readily seen that X is in the triangle C_3S-V-CaO. It is therefore known that the liquid follows the curve TV and, by the same procedure, that it follows the curve beyond V to D.

The primary phase regions for CaO, C_3S and C_3A meet at point D. At 1470 deg., liquid D is capable of existing in equilibrium with these three solid phases. CaO and C_3S are the solid phases present when the liquid arrives at D, but C_3A appears and crystallization proceeds with liquid D present, so that there are now four phases present, liquid D and solid CaO, C_3S and C_3A. The process continues without change of temperature until one of these phases disappears. There are four combinations of three phases each, as follows:

1. CaO, C_3S, liquid D
2. CaO, C_3A, liquid D
3. C_3S, C_3A, liquid D
4. CaO, C_3S, C_3A

The first combination represents the phases present when the liquid arrived at D. Mixture X cannot be formed from the phases in combinations 2 and 3, since X is not in the triangle formed by joining the points indicated in either combination. Combination 4 is possible, since X is in the triangle CaO-C_3S-C_3A. In this way it is found that crystallization of mixture X proceeds to completion with the liquid path ending at D. A study of the course of crystallization of other mixtures in triangle CaO-C_3S-C_3A leads to division of the triangle into three areas which differ in the order of appearance and disappearance of solid phases in the normal course of crystallization. In each area, normal crystallization begins with the appearance of the primary phase, CaO, and ends with liquid D present until the last drop of liquid disappears. The three areas, with the solid phases listed in the order in which they are present, are indicated below.

1. Triangle CaO-C_3S-k.
   CaO; CaO, C_3S; CaO, C_3S, C_2S (at point K); CaO, C_2S; CaO, C_2S, C_3A.
2. Triangle CaO-k-d.
   CaO; CaO, C_3S; CaO, C_3S, C_3A.

(Continued on page 104)

*Former senior research mathematician, Portland Cement Association Research and Development Laboratories, Chicago, Ill.

†The normal course of crystallization refers to an ideal process, in which equilibrium is attained at each temperature before another small decrease in temperature occurs.

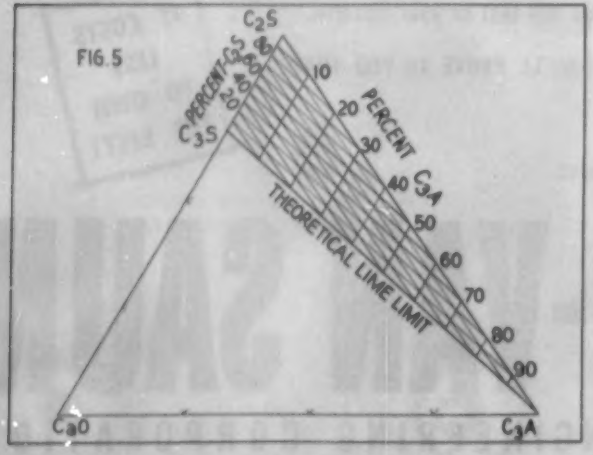
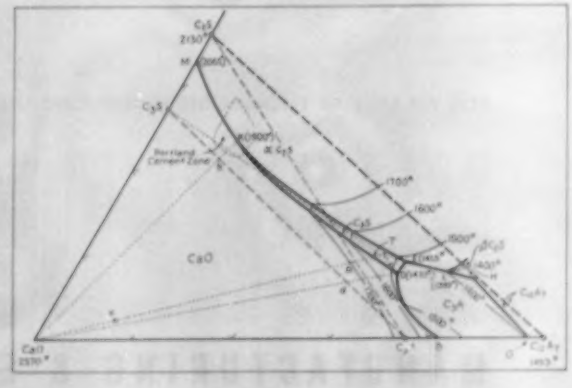


Fig. 5: Final products of crystallization in the system C_2S-C_3S-C_3A

Fig. 4: The system CaO-C_3S-$C_{12}A_7$, shown below



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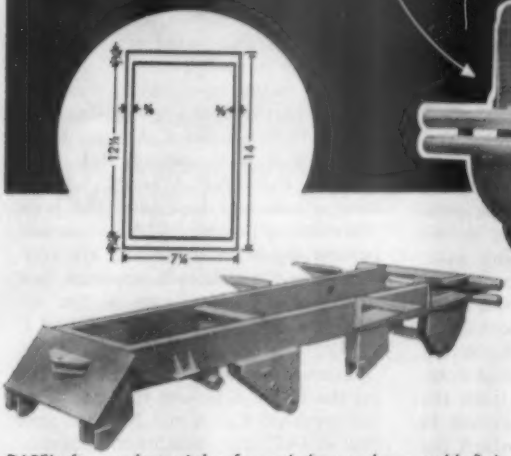

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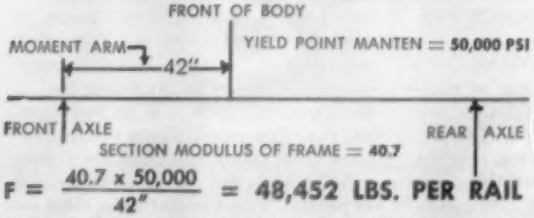
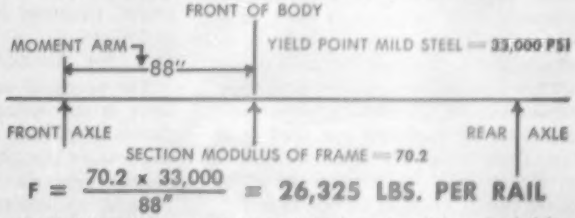


$$F = \frac{40.7 \times 50{,}000}{42''} = 48{,}452 \text{ LBS. PER RAIL}$$

COMPARATIVE TRUCK "A", 22-TON



$$F = \frac{70.2 \times 33{,}000}{88''} = 26{,}325 \text{ LBS. PER RAIL}$$

Section Modulus—the theoretical cross-section of a member which when multiplied by yield point of the steel (etc.) used and then divided by the moment arm (in inches) will give you the force required to cause a failure of the member.

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D-107

3. Triangle CaO-d-C_3A.
CaO; CaO, C_3A; CaO, C_3S, C_3A.

The reason for the plan which was followed in choosing the pairs of compounds which are joined by the dotted lines in Fig. 3, (see ROCK PRODUCTS, May, 1955, p. 72) may now be understood. For each triangle so obtained there is a corresponding point at which three primary phase regions meet, and these primary phases are those at the vertices of the triangle. At this point crystallization of all compositions in the triangle are completed. For example, liquids in the triangle C_3S-C_2S-C_3A normally complete their crystallization with the liquid at point E, Fig. 4, until the last drop of liquid disappears, leaving only solid C_3S, C_2S and C_3A. Point E is outside of the triangle C_3S-C_2S-C_3A, and is therefore classed as a peritectic point. Point D is also a peritectic point. A point inside the triangle which defines the range of compositions that complete their crystallization at the point is classed as a eutectic point. Both eutectic and peritectic points are invariant points.

When the liquid phase is at an invariant point, changes in proportions of phases occur without change in temperature. This was shown in the crystallization of composition X, Fig. 4. When the liquid arrived at D, three phases were present, solid CaO, C_2S, and liquid D. Another phase, solid C_3A, appeared, and there were then four phases present. The proportions of these phases changed until finally one phase, liquid D, disappeared. These changes in proportions of phases which occur at a constant temperature involve changes in heat content. During crystallization, or the reverse process of fusion, at an invariant point there is a tendency to maintain a constant temperature until the changes in phase composition are completed. This appears in the curve obtained when temperature during cooling or heating is plotted against time. When the difference between maximum and minimum heat content at a particular temperature is large, there may be a step in the curve. Significant points at which energy changes occur are not always readily seen on the time-temperature curve, particularly when small quantities of materials are used in a test. These points are sometimes found by a method of magnifying the effect of an energy change, known as differential thermal analysis. This method is useful in locating invariant points and other points of energy change.

The System C_3S-C_2S-C_3A

The raw materials used in the manufacture of portland cement clinker contain Fe_2O_3, MgO and a number of minor constituents in addition to the three oxides, CaO, Al_2O_3 and SiO_2. However, it is possible to make portland cement clinker containing only the three oxides, on a laboratory scale. Such clinkers are located in the triangle C_3S-C_2S-C_3A, (Fig. 3). The approximate range of compositions of the three oxides comparable with the commercial product is designated as the "portland cement zone" in Fig. 4.

Invariant points in the system CaO-C_3S-$C_{12}A_7$ are listed below:

Point		Temp. Deg. (Cent.)	CaO	Al_2O_3	SiO_2
M	2065	CaO, αC_2S	67.5	—	32.5
B	1535	CaO, CaA	57.0	43.0	—
G	1395	CaA, $C_{12}A_7$	50.0	50.0	—
K	1900	CaO, αC_2S, C_3S	68.4	9.2	22.4
L	1390	αC_2S, βC_2S, CaA	54.5	38.0	7.5
H	1355	βC_2S, CaA, $C_{12}A_7$	52.0	41.2	6.8
D	1470	CaO, C_3S, CaA	59.7	32.8	7.5
E	1445	C_3S, C_2S, CaA	58.3	33.0	8.7

The final products of crystallization of liquids or partially fused materials in the triangle C_3S-C_2S-C_3A are the compounds at the vertices of the triangle. In studying the changes which occur in the clinkering process, it is convenient to transform oxide compositions to composition expressed in terms of these compounds. The compound compositions may be calculated for mixtures of the three oxides which have not actually been combined to form the compounds. The calculated compound composition may be termed the *potential* composition, to avoid the implications that the compounds are necessarily present in the calculated proportions. In any case, however, the potential composition indicates the percentages of the compounds which would be present if the oxides were combined to form the three compounds. The potential composition may be calculated from the oxide composition by substitution in the following equations, in which the coefficients are based upon 1952 atomic weights.

$C_3S = 4.0715\ CaO - 7.5996\ SiO_2 - 6.7182\ Al_2O_3$ (1)
$C_2S = 8.5996\ SiO_2 + 5.0681\ Al_2O_3 - 3.0715\ CaO$ (2)
or, $C_2S = 2.8665\ SiO_2 - 0.7544\ C_3S$ (2a)
$C_3A = 2.6501\ Al_2O_3$ (3)

In these equations the chemical formulas refer to percentages of the indicated compounds or oxides. For example, equation 3 may be expressed as follows:

$$\%\,C_3A = 2.6501\ (\%\,Al_2O_3)$$

The potential compositions of mixtures in the system C_3S-C_2S-C_3A are shown graphically in Fig. 5. The triangle C_3S-C_2S-C_3A is divided into 10 percent intervals of each of the compounds, as described in connection with Fig. 1.

The line C_3S-C_3A is designated as the "theoretical lime limit." All compositions on this line contain sufficient CaO to convert all of the SiO_2 present to C_3S and all of the Al_2O_3 present to C_3A. Any excess of CaO beyond that amount of CaO must be uncombined. This is in addition to any free lime which may be present because of poor burning or other reasons. The line representing the theoretical lime limit also represents zero percent potential C_2S. Thus, the theoretical lime limit is attained when the potential C_2S is zero, or when

$$CaO = 2.80\ SiO_2 + 1.65\ Al_2O_3.$$

Point X on the line $C_2S - C_3A$ represents the composition 41.9 percent C_2S, 58.1 percent C_3A. That is the composition when crystalline equilibrium is attained at 1455 deg. It will be shown presently that this mixture has a quite different phase composition when the heat content is maximum at that temperature.

When a mixture in the system C_3S-C_2S-C_3A is maintained at 1455 deg., liquid E and the solid phases C_2S, C_3S and C_3A may coexist in a state of equilibrium. However, as heat is added to the system at 1455 deg., the maximum heat content and maximum quantity of liquid E are attained simultaneously, and one of the solid phases disappears. The proportions of solid phases and liquid may be estimated by joining point E, Fig. 4, with the points representing the solid phases. This is shown in Fig. 6 for the case in which solid C_3A disappears, leaving C_3S, C_2S and liquid E. The triangles C_3S-C_2S-C_3A and C_2S-C_2S-E have a common base, and the lines representing potential C_3A in one and percent liquid in the other, are consequently parallel. It is apparent that for cement compositions in the triangle C_3S-C_2S-X the percent liquid E is proportional to the potential C_3A.

Considering the position of point X on the line C_2S-E, and the lengths of the segments C_2S-X and XE, it is seen that at 1455 deg., maximum heat content, a mixture of that composition is composed of 33.5 percent C_2S, 66.5 percent liquid E. If the mixture is quenched while in that state, so that the liquid is frozen to a glass, the cooled material will contain 33.5 percent C_2S, 66.5 percent glass. On the other hand, if it is cooled slowly, so that normal crystallization occurs, it will contain 41.9 percent C_2S, 58.1 percent C_3A, and no C_2S. As mentioned previously in discussing Fig. 5, the appearance of C_2S in greater quantity than in the crystallized product applies to all compositions in the system C_3S-C_2S-C_3A, but the effect is greatest at point X. It is due to the fact that invariant point E is outside of the system, in a direction away from the C_2S vertex. If point E were inside the triangle C_3S-C_2S-C_3A, this effect would not appear. The increase in the percentage of C_2S through quenching at the temperature of liquid formation may seem to offer promise as a method of manufacturing a high early

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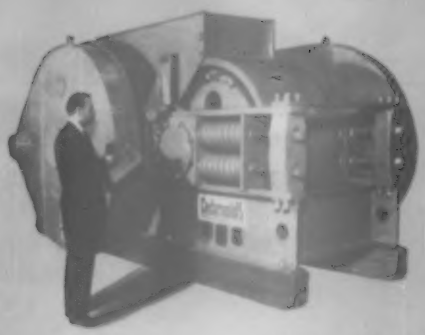

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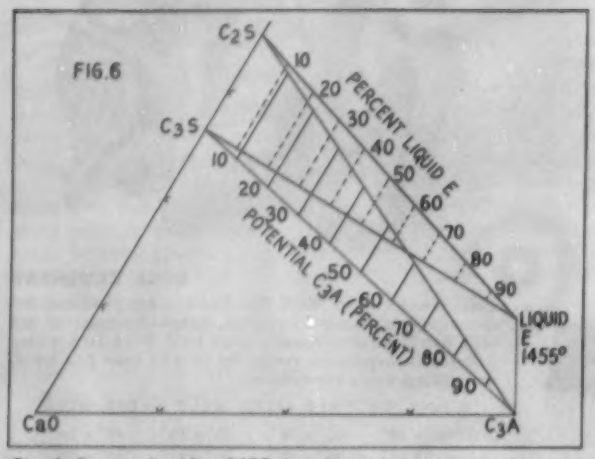


Fig. 6: Percent liquid at 1455 deg. (max. heat content) for compositions in triangle C_2S-C_3S-x

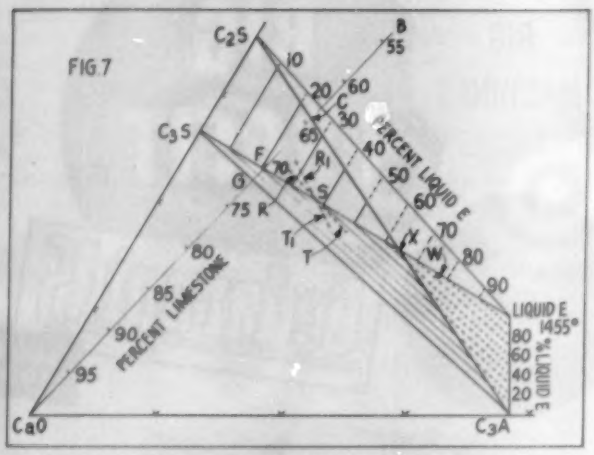


Fig. 7: Percent liquid at 1455 deg. (max. heat content)

strength cement (high C_3S). However, the condition applies to portland cements made from the three oxides, and does not apply when other oxides, such as Fe_2O_3, or Fe_2O_3 and MgO, are added to the system. It serves to illustrate the fact that burning and cooling conditions play an important part in determining the chemical nature of the final product.

In Fig. 7 the proportions of liquid at 1455 deg., maximum heat content, are shown for the entire system C_3S-C_2S-C_3A. In the discussion of Fig. 6 it was shown that, for compositions in the triangle C_3S-C_2S-X, solid C_3A disappears when the quantity of liquid reaches a maximum at 1455 deg., and the percent of liquid is proportional to the *potential* C_3A. A similar situation exists in the triangle C_3S-X-C_3A. Here C_3S disappears when the quantity of liquid reaches a maximum at 1455 deg., and the percent of liquid is proportional to the *potential* C_3S. That the latter is true may be readily seen. Lines representing 10 percent intervals of potential C_3S are parallel to the C_3S-C_3A side of the triangle, as shown in Fig. 5. The lines representing 10 percent intervals of liquid in the triangle C_3S-X-C_3A are also parallel to that side, so that the percent of liquid is proportional to the potential C_3S.

The percent of liquid in a mixture in the system C_3S-C_2S-C_3A, at maximum heat content at 1455 deg., may be estimated from Fig. 7 by locating the composition in the diagram. The quantity of liquid may be increased by raising the temperature. This will be considered presently. However, it is of interest to consider the relation of composition to liquid content at 1455 deg. (the lowest clinkering temperature) in a manner more closely related to control of composition in the manufacturing process. The raw materials commonly used in the manufacture of portland cement clinker are limestone and clay or shale. For a comparable situation in the ternary system, we will let pure CaO represent limestone and a mixture composed of 77 percent SiO_2, 23 percent Al_2O_3 represent clay. The line CaO-B in Fig. 7, when extended, passes to the point representing the clay. These materials will be referred to as limestone and clay, to carry out the comparison with the commercial process. It will be assumed that the materials are pulverized. Proportions of the two materials will be expressed on an ignited weight basis.

Starting at 55 percent limestone and passing toward the CaO vertex, the C_3S-C_2S-C_3A triangle is encountered at point C (64.5 percent limestone). At this point, 25 percent liquid E is present at maximum heat content, sufficient to cause the agglomeration of particles into a clinker. As the percent of limestone is increased, the proportion of liquid is reduced, until at F, (70.5 percent limestone) about 20 percent liquid E is present. Throughout this range, the quantity of liquid is sufficient to act as a medium through which chemical reaction can occur toward the attainment of equilibrium; that is, the temperature of liquid formation, 1455 deg., is sufficient for the accomplishment of the desired reactions, and there is no need of raising the temperature.

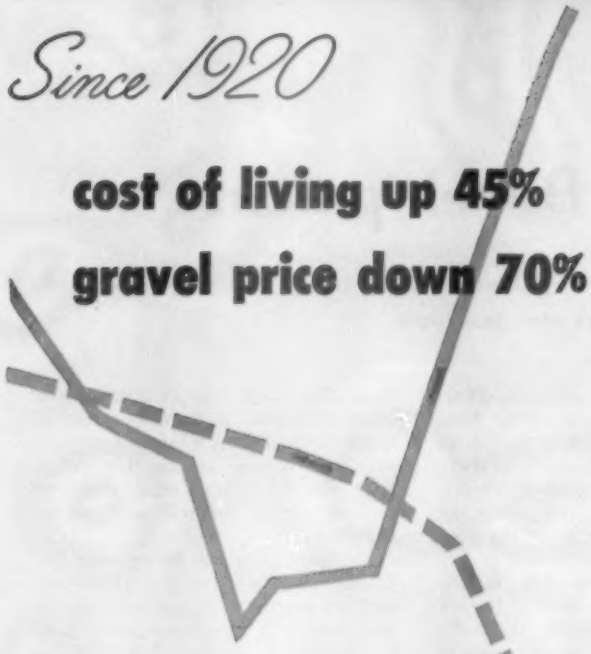
In the region between C and F the effect of changes in percentage of limestone on liquid content is not great, since the lines representing 10 percent intervals in liquid content are far apart, and the line CaO-B makes only a small angle with them. After passing the line C_3S-E at F, the percent of liquid is governed by the potential C_3S, as shown previously. In this region the lines representing 10 percent intervals of liquid E are closely spaced, and they are crossed almost at right angles by the line CaO-B. The small increase of 1.2 percent in the proportion of limestone in passing from F to G is accompanied by a decrease in liquid content from about 20 percent to zero. Higher temperatures are required to secure sufficient liquid, but in this range of compositions the increase in liquid content may be accompanied by other undesirable conditions which will be discussed presently.

One of the most important considerations is controlling proportions of materials in the manufacture of cement clinker is that of securing a liquid content which will lead to the attainment of equilibrium in a reasonable time. From the foregoing study of Fig. 7 with reference to conditions at the temperature of liquid formation, it may be readily understood that for ternary compositions between C and F the control of proportions of limestone and clay is not nearly as critical as in compositions between F and G. In fact, the effect of a change of 1.00 percent in the percentage of limestone on the percent of liquid E is 24 times as great between F and G as it is between C and F.

It has been found in the foregoing study that in the case of mixtures in the triangle C_3S-X-C_2S, the quantity of liquid at 1455 deg. is proportional to the potential C_3A, while in the triangle C_3S-X-C_3A the quantity of liquid E is proportional to the potential C_3S. This has been demonstrated graphically. A similar situation exists when other components are added to the system, as in the case of commercial portland cement clinker. To demonstrate this similarity it will be necessary to compute percentages of solid phases and liquids, since graphic meth-

(Continued on page 134)

Since 1920



In their first year of operation, 1920, Grand Rapids Gravel Co. produced 100,000 tons of aggregate. Last year, they sold over 900,000 tons. Price per yard of gravel in 1920 was $1.30. Price per yard today is 40c. Despite general inflation, costs have been reduced by use of better methods — today's 2½-yd. dragline and LeTourneau-Westinghouse haulers are much more efficient than the ½-yd. steam-shovel and horse teams used in 1920, or the excavators and rail or crawler haul used in more recent years.

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GRAND RAPIDS GRAVEL COMPANY, largest pit operator in western Michigan, produces 215,000 tons of ready-mixed concrete, 350,000 tons of sand, and 350,000 tons of gravel and crushed stone yearly. Until 1951, the Company used railcars, crawlers, and side-dump wagons to haul sand and gravel from pit to grizzly. Then, looking for a way to cut costs, they brought in a LeTourneau-Westinghouse 18-ton Rear-Dump.

This unit, assigned to the Grand Rapids pit, proved so economical and efficient its first year, the Company added a second LeTourneau-Westinghouse Rear-Dump a year later for use in the Grand Rapids pit . . . then a third the following year for their Grandville pit.

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In typical production, haulers are loaded with 13½ to 14½ bank yards of sand and gravel in 6 passes of a 2½-yd. dragline. Load time averages 2¾ minutes. 1600′ haul is made at 19 mph . . . 1600′ return at over 20 mph. Each 3200′ cycle takes about 5 minutes. Except for delays at grizzly, each hauler can deliver 10 loads (135 to 145 bank yards) per 50-minute hour. Six to eight loads (80 to 116 bank yards) per unit per hour, however, is usually all the Company's crusher can handle.

Big 9½′ x 12′ opening, together with low rear entry, makes Rear-Dump an excellent dragline target. Loads of 13½ to 14½ bank yards of sand and gravel take 2¾ minutes and 6 passes of 2½-yd. dragline.

98% mechanical efficiency

With 6,000 and 4,000 hours on the 2 veteran machines at Grand Rapids, and 1500 hours on the newer rig at Grandville, the 3 Rear-Dumps have shown a combined mechanical efficiency of 98%. The first hauler has been driven over 60,000 miles on its present tires . . . the second, over 40,000 miles . . . the newest machine, over 15,000 miles. Foreman Brocker expects treads on the 2 older machines to last two more seasons before recapping will be needed.

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ROTARY KILN
Its Performance and Development

Part 4: Effect of conductivity and calcining resistivity; heat balance and heat loss manipulations

By VICTOR J. AZBE

WHILE PRECEDING ARTICLES dealt only with the effect of size and shape of the rate of calcination, it is also affected by the chemical and physical characteristics. An extended study is now being made of this phase, but it will not be ready for another year. The subject will only be introduced in abstract because it has an important bearing on rotary kiln operation.

Magnesitic, dolomitic and hydraulic limestone are being omitted from present consideration, and only four of the better known domestic and two foreign high calcium types will be considered; the latter for reasons of special calcining characteristics.

Some stones are dense, others are porous. If stone is porous, the lime of course also will be far more porous, particularly in its soft burned, unshrunken state. On this account some stone may be of lower and some of quite low heat conductivity. Some stone calcines readily, requiring a lower temperature; others for some not well known reason are calcination-resistant, requiring for an equal rate a temperature possibly several hundred degrees higher.

It must be understood that reference is not to the temperature differential between the surface of the stone and the calcining face. For this, there must be a difference as otherwise there would be no heat flow, and this difference will be higher, the greater the calcining rate and the lower the conductivity.

Calcination temperature of the calcining interface may be by 100 or even 200 degrees higher than the supposed calcination temperature of 1648 deg. F.

Tests were made on ¾-in. cubes and all tests were run under the same conditions, as closely as possible. To further assure this, all tests were run by the same person, Warren Weisz, chemical engineer, a thorough worker.

During all tests, the furnace surface temperature, the sample center of core temperature and the sample weight were followed by the minute.

Fig. 19 presents the furnace temperature, the sample core temperature and the weight loss curves. It also shows some of the tabular data, of which specific gravity of the stone, determined before the test, and of the lime are important.

It will be noted that stone No. 8 is extremely porous and stone No. 6, for a high calcium type, is extremely dense. The total time of preheat and calcination was more in the case of dense stone, but in minutes per gram of weight it was far less. The difference was 50 percent more time per unit of weight for the very porous specimen.

Ordinarily it would be assumed that calcination would begin at 1648 deg., and the core (not the surface) acquire and remain at this temperature until calcination is complete. But of all stone samples only the porous No. 8 remains close to 1648 deg. F.; all others asssume positions farther away and No. 3 particularly, 122 deg. F.

This condition of superheat could be ascribed to relative porosity, that CO_2 cannot escape and pressure builds up. This may be partially true, but it is doubtful because the dense stone No. 6, the most rapidly calcining with the highest rate of CO_2 exudation, had a calcining temperature of little over 1700 deg. F.

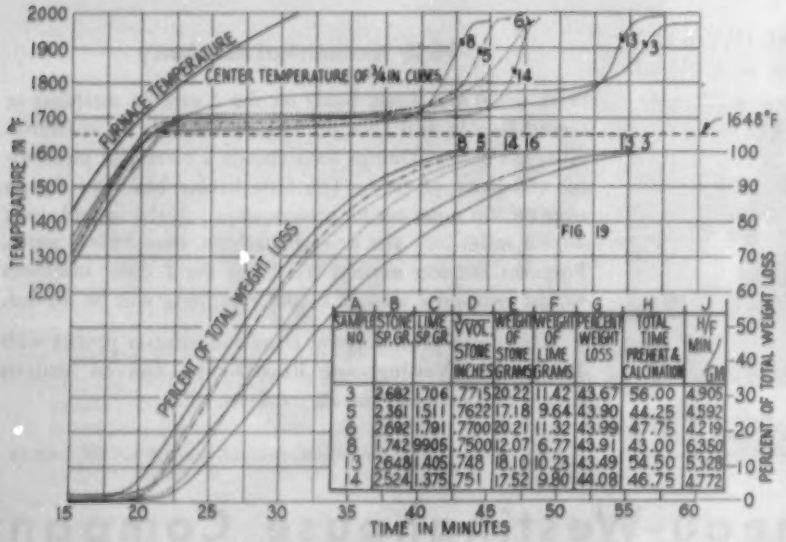
No doubt it is a matter of crystalline arrangement, of interfacial calcining surface, something too mooted to be discussed here. For the present we must be satisfied to know that this condition exists. In addition to this, the stone contains a small amount of exceptional resisting material, since all calcinations terminate at high temperatures and all approach the end of weight loss sluggishly in spite of this high temperature.

It is believed that any calcium carbonate stone of high purity will require the same amount of heat for its calcination. The difference will be in temperature and in time required caused by the calcining resistivity and by conductivity variations.

The area between the furnace temperature and sample temperature would be called "calcination-inducing area." The area between the sample temperature and the 1648 deg. F. base line would be called "calcination-resisting area." The areas can be determined by a planimeter and should be reduced to degree - minutes per gram of lime. The two combined would constitute the "total calcining effort" in degree - minutes per gram.

Not very much attention has been paid by the industry to conductivity

Pres., Asbe Corporation, St. Louis, Mo.



A SAMPLE NO.	B STONE SP.GR.	C LIME SP.GR.	D VOL. STONE INCHES	E WEIGHT OF STONE GRAMS	F WEIGHT OF LIME GRAMS	G PERCENT WEIGHT LOSS	H TOTAL TIME PREHEAT & CALCINATION	J H/F MIN / GM
3	2.682	1.706	.7715	20.22	11.42	43.67	56.00	4.905
5	2.361	1.511	.7622	17.18	9.64	43.90	44.25	4.592
6	2.692	1.791	.7700	20.21	11.32	43.99	47.75	4.219
8	1.742	9905	.7500	12.07	6.77	43.91	43.00	6.350
13	2.648	1.405	.748	18.10	10.23	43.49	54.50	5.328
14	2.524	1.375	.751	17.52	9.80	44.08	46.75	4.772

Fig. 19: High calcium stone rate of calcination tests

Pushing bladeful of sticky mud washed down by rain, Tournatractor clears rock ledge in a hurry so drill crews can go to work.

1 machine handles all tractor work at 277-acre quarry & plant

To handle all the tractor jobs scattered around their 277-acre quarry and plant site in northern Illinois, a large cement company uses only 1 machine — a 186 hp Tournatractor.

In an average 8-hour day, this rubber-tired rig covers 20 to 25 miles in job-to-job travel. With a crawler-tractor, this would mean nearly half a shift would be spent lumbering along at top speeds of 5 to 7 mph just to get from one job to the next. With 19 mph Tournatractor, travel time to cover all the regular and emergency assignments around the 277 acres takes only an hour to hour-and-a-half . . . all the rest of the shift is productive work time. Tournatractor always takes shortest route between assignments . . . goes over haul roads, pavement, or cross country . . . drives over tracks without planking.

Three or four passes is all it takes for Tournatractor to clean up around stripping shovel. This is an hourly "housekeeping" job that speeds truck spotting and shovel production.

Completes 2-day track-move in 2 hours

Principal job for Tournatractor is cleaning up around stripping shovel. In spare time, the tractor also:

1. Cleans up overburden unloaded by company's 3 side-dump trucks
2. Stockpiles coal
3. Maintains trash pile
4. Handles emergency switching of railroad cars used primarily to transport the 1,500,000 barrels of cement produced here annually.
5. Builds new roads
6. Maintains existing roads
7. Prepares drill sites by cleaning dirt from rock ledges
8. Relocates track for rock trains in quarry (does in 2 hours what by hand labor used to take 2 days)
9. Handles emergency dozing around pit and plant

"Does everything but sweep out the office"

"We like the Tournatractor," says the pit foreman, "because of its work speed and because of its speed in getting from job-to-job." Adds the operator, "With Tournatractor, you can get around and do a lot of different jobs fast! It does everything around here but sweep out the office."

Get all the facts

Before you buy another set of tracks, it will pay you, too, to investigate the high speeds, lower maintenance, and greater mobility Tournatractor can give. Your LeTourneau-Westinghouse Distributor will be glad to arrange a demonstration on your job so you can check these advantages first-hand.

Finishing clean-up around rock shovel, Tournatractor "runs" on big rubber tires to next assignment. Its mobility, and the speed with which it completes each job, are major reasons why Tournatractor does a volume of work that otherwise takes 2 or 3 crawlers to handle.

Tournatractor—Trademark T-669-Q-b

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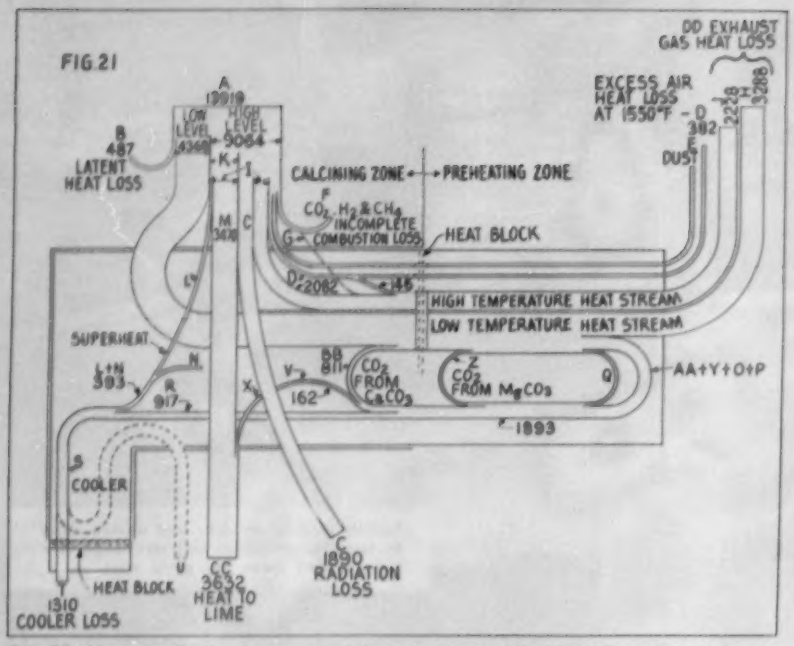

Fig. 21: Heat distribution in a rotary kiln operating at 10 million B.t.u./ton high calcium lime—95 percent CaO burn. Stock temperature is 1550 deg. F

of stone and lime. Now these carefully conducted calcination tests of samples of equal size and shape, run under equal conditions, revealed the factor of conductivity as of supreme importance.

In Fig. 20 the lime specific gravity is plotted against time of preheat and calcination reduced to minutes per gram of lime weight. There is the stone group, Nos. 5, 6, 8, 9, which is subject to the minimum of resistivity and whose calcination rate is governed most by conductivity, the effect of porosity. A smooth curve can be drawn through these. The other samples would be similarly affected by porosity, but are thrown off the line by resistivity, which follows no general law and so this group is scattered and some locate rather substantially off the curve for normally resisting limestone.

Samples 3 and 13 are shown by curves in Fig. 19. No. 3 has a higher calcination curve, but in terms of lime weight and time, No. 13 is the most notable as shown by its location in Fig. 20. Regardless of what the resistivity is, calcination time would be prolonged by increased porosity. Supposing we have a stone that gives a fluffy lime, heat acceptance by any one piece would be less and heat conductivity into the bed would also be less. If in such cases the bed is very heavy, as when induced by a dam, calcination may be unduly retarded, and the operators by experience may then insist on maintaining a thin bed. But when conductivity is good, the problem is that of resistivity, and dams may be accepted.

It should be further realized that the conductivity of the bed is not the same all along the kiln length. Where there is stone, the conductivity is quite a bit more, and the more lime there is the lower it gets and is lowest when the battle is on to get that last one or two percent of additional availability. There is no help for this condition except kiln segmentation.

Lime Kiln Heat Balance

In Fig. 21, the various main heat streams are shown graphically to the scale of their magnitude. The diagram represents a kiln requiring 10 million B.t.u. per ton of lime, with no recuperative stone preheating, the gases escaping the kiln at 1500 deg. F.

The identification letters of the various streams are the same as the diagram in Fig. 2, (see ROCK PRODUCTS, February, 1955, p. 102) and referred to also in the accompanying descriptive tabulation. In all of the following diagrams the same letter refers to the same heat stream.

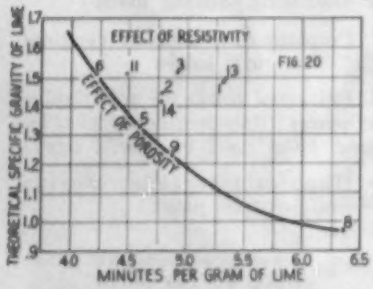

Fig. 20: Effect of porosity and resistivity on the calcining rate of high calcium lime

The problem with which we are confronted is the minimization of the heat losses of this kiln. The question is what exactly to do. The lengthening of the kiln does not solve the problem. Should a cooler be installed, a stone preheater, segments, any of these, or all of them? What would be the effect therefrom?

Basically, what is desired is a "heat block" between the calcining and preheating zones against escape of heat of high temperature elevation; a "heat block" at the cooler against escape of any sensible heat of the lime; and provisions, whatever these may be, against escape of sensible heat from the outer wall surfaces of the calcining zone and the cooler. In the overall, it means "conservation of heat of high elevation toward its use for calcination purposes."

To simplify the matter, in the following diagrams, where conditions are improved by various combinations step by step, incomplete combustion and water of the fuel were omitted entirely and the radiation loss was accepted to be 15 percent for the low and 14.4 percent for the high heat value of the fuel.

Lime discharge temperature was assumed to be 2000 deg. F. throughout, and the low temperature level stream "H," the heat of products of combustion above 1525 deg. F., also remains constant at 4450 B.t.u.

The diagram in Fig. 22 represents a simplified heat balance of a nonrecuperative kiln; that is, a kiln without a cooler, preheater, or any extra kiln length. The exhaust gases escape at 1525 deg. F., losing 39.7 percent of the heat. Efficiency is 31 percent, heat consumption is 8.49 million B.t.u. per ton, but this would have been closer to 10 million if the above mentioned more minor losses had not been for convenience deliberately excluded.

The cooler loss "S" is 11.2 percent which is low, but not very much lime is made. The high level heat loss "J," 2282 B.t.u. of calcining heat from the hot zone, is high, resulting eventually in high exhaust loss. Stone was preheated with heat from stream "J" rather than from "H."

In the diagram, Fig. 23, a fully functioning lime cooler is incorporated, but otherwise the kiln is still operated with 1525 deg. F. exhaust temperature. The benefit is from recuperative cooling only, none from the additional stone passing through the preheating zone induced through the cooler action. To obtain this benefit, exhaust temperature would have to be less than 1525 deg. and the loss of "J," lower. As it is, this loss is high-

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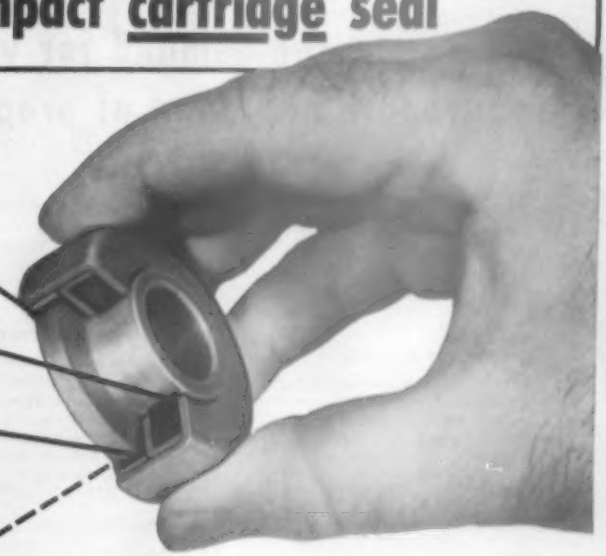

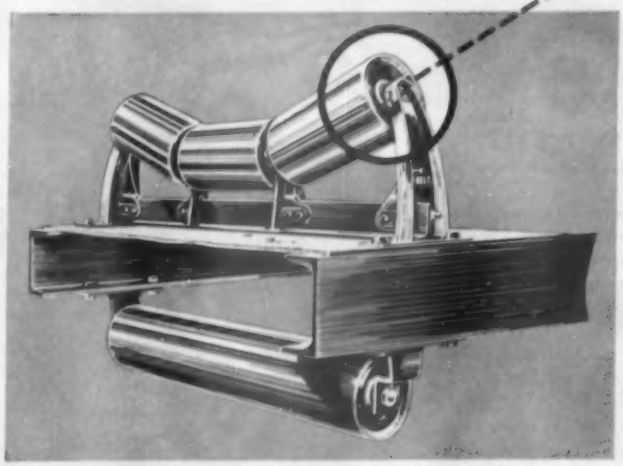

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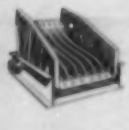

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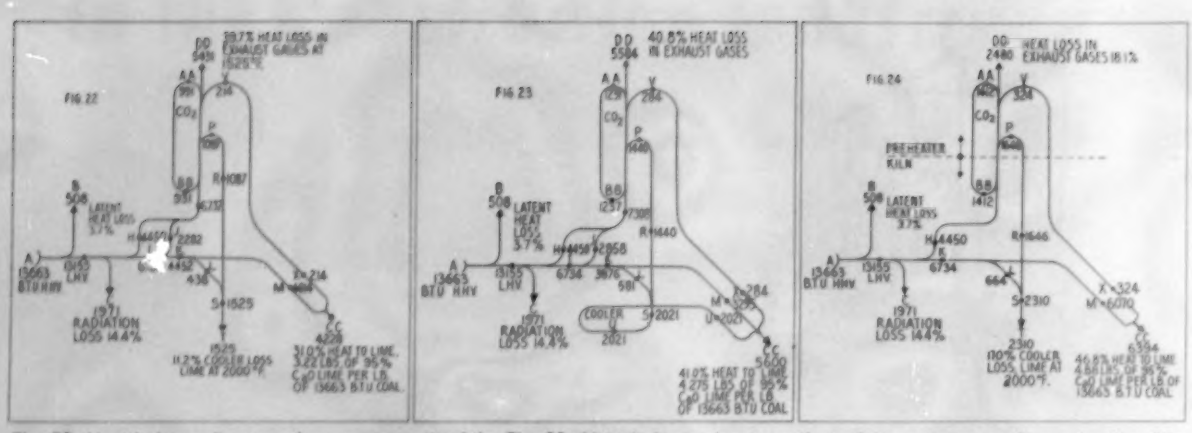
FIG 22
29.7% HEAT LOSS IN EXHAUST GASES AT 1525°F.
LATENT HEAT LOSS 3.7%
13663 BTU HHV
1971 RADIATION LOSS 14.4%
11.2% COOLER LOSS LIME AT 2000°F.
31.0% HEAT TO LIME. 3.22 LBS. OF 95% CaO LIME PER LB. OF 13663 BTU COAL
FIG 23
40.8% HEAT LOSS IN EXHAUST GASES
LATENT HEAT LOSS 3.7%
13663 BTU HHV
1971 RADIATION LOSS 14.4%
41.0% HEAT TO LIME 4.275 LBS OF 95% CaO LIME PER LB OF 13663 BTU COAL
FIG 24
HEAT LOSS IN EXHAUST GASES 18.1%
PRE-HEATER
KILN
LATENT HEAT LOSS 3.7%
13663 BTU HHV
1971 RADIATION LOSS 14.4%
10.0% COOLER LOSS LIME AT 2000°F.
46.8% HEAT TO LIME 4.88 LBS. OF 95% CaO LIME PER LB OF 13663 B.T.U. COAL

Fig. 22: Heat balance diagram of non-recuperative kiln. **Fig. 23:** Heat balance showing effect of recuperative cooling only. **Fig. 24:** Heat balance diagram showing effect of recuperative preheater

er on account of the additional lime made, limiting the gain derived from the use of the cooler. There is a decided improvement; only 6.39 million B.t.u. being required per ton of lime, based on the losses indicated.

If a stone preheater had been installed, but not the cooler as shown in Fig. 24, the radiation loss would not have been increased, and hot zone high temperature level loss "J" would have completely disappeared. Heat consumption per ton would have been only 5.6 million B.t.u., even though the exhaust loss would still have been 18.1 percent and the cooler loss increased to 17 percent.

From this it would appear that the preheater would be more important than the lime cooler, but this is not necessarily so. To obtain the foregoing results from the preheater, the radiation loss would have had to remain at 14.4 percent and the gases would have to be leaving the calcining zone and the stone entering the calcining zone at calcining temperature; which conditions are almost impossible.

If the kiln, with the cooler, and no preheater, Fig. 23, would have been operated so that exhaust cooling had been obtained from the additional stone then, due to additional lime, the results with the cooler only would have been 5.41 million B.t.u., or better than with the preheater only. This is shown by Fig. 25. Our belief is that a lime cooler of suitable and effective type is a more important adjunct than the stone preheater.

Fig. 26 shows results, on the same basis, when both cooler and preheater are used. Exhaust loss is only 10.6 percent and, since there is no cooler loss, 3.68 million B.t.u. are required per ton of lime, to which the heat of the losses omitted should be added. Chances are that radiation loss would have increased, but whatever that may be, it is plain that one needs to both preheat the stone and cool the lime and conserve the heat therefrom to useful ends. Results such as these are often obtained with mixed feed kilns.

(Continued on page 130)

EFFECT OF COOLER, PREHEATER AND QUADRANTS

	B.t.u. Per Ton Million	Lbs. Lime Per Lb. Coal	Thermal Efficiency	Sensible Heat Exhaust Loss	Cooler Loss	Radiation Loss	Latent Heat Loss
Nonrecuperative Preheating and lime cooling	8.49	3.22	31.1	39.7	11.15	14.4	3.7
Recuperative cooling only, nonrecuperative preheating	6.39	4.27	41.0	40.9	—	14.4	3.7
Recuperative preheating, nonrecuperative cooling	5.69	4.88	46.8	18.2	16.9	14.4	3.7
Recuperative cooling and recuperative preheating due to additional stone	5.41	5.05	48.5	33.4	—	14.4	3.7
Full recuperative cooling and preheating	3.68	7.42	71.3	10.6	—	14.4	3.7
Recuperative cooling and adequate kiln segmentation	3.66	7.47	71.6	17.5	—	7.2	3.7
The ideal kiln	2.84	9.61	92.1	4.2	—	—	3.7

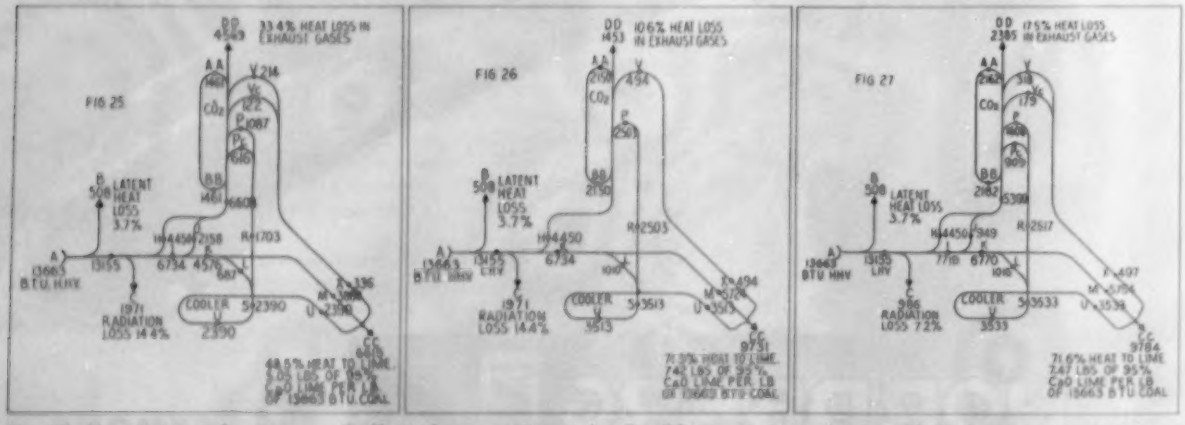
FIG 25
33.4% HEAT LOSS IN EXHAUST GASES
LATENT HEAT LOSS 3.7%
13663 BTU HHV
1971 RADIATION LOSS 14.4%
49.5% HEAT TO LIME 5.05 LBS. OF 95% CaO LIME PER LB OF 13663 BTU COAL
FIG 26
10.6% HEAT LOSS IN EXHAUST GASES
LATENT HEAT LOSS 3.7%
13663 BTU HHV
1971 RADIATION LOSS 14.4%
71.3% HEAT TO LIME 7.42 LBS OF 95% CaO LIME PER LB OF 13663 BTU COAL
FIG 27
17.5% HEAT LOSS IN EXHAUST GASES
LATENT HEAT LOSS 3.7%
13663 BTU HHV
RADIATION LOSS 7.2%
71.6% HEAT TO LIME 7.47 LBS OF 95% CaO LIME PER LB OF 13663 BTU COAL

Fig. 25: Heat balance showing overall effect of recuperative cooler. **Fig. 26:** Heat balance showing effect of recuperative cooler and preheater. **Fig. 27:** Heat balance showing effect of cooler and quadrant application

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Small Plant
AIR FILTERING Practices

By L. LAWTHER

THE PROBLEM OF DUST AND AIR POLLUTION control occupies the minds of many production engineers. Although large plants in crushed stone production have more or less solved their big problems by means of mechanical, thermal and electrostatic precipitators, the small plant lags much behind. In many instances it would be economically impossible to provide for means for avoiding air pollution. A smaller quarry cannot be expected to erect installations for cleaning of exhaust air or gases on a grand scale. Air filters of modern design should be incorporated in the ventilation — and heating system, and special attention should be given to air filtering or washing where an all-year-round air conditioning system is planned. In the following, a brief survey will be given on air filtering methods and available air filter types for the above purposes.

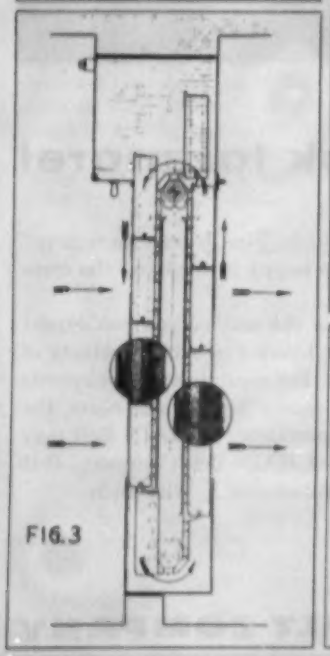
Characteristics of Air Filtration

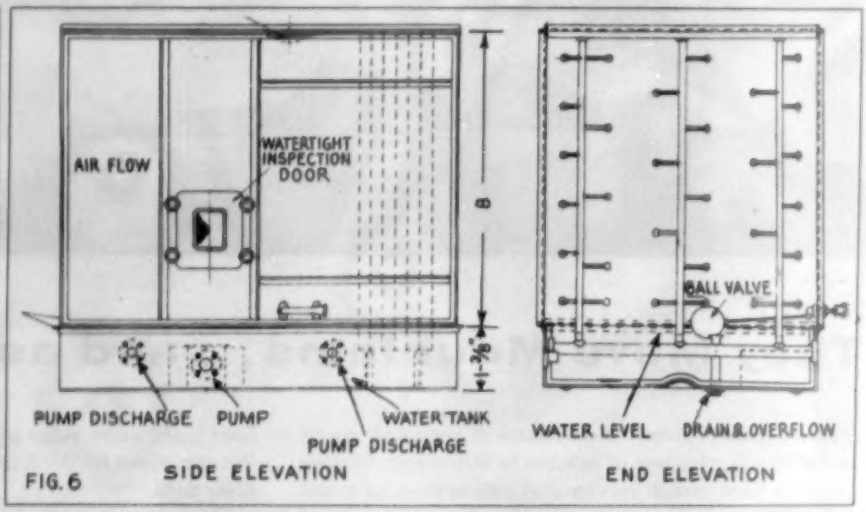
When outside air is brought into the plant by means of fans or ventilation systems, a great variety of air filters for room air are available. Typical air filters usually consist of a frame made from metal, wood, or other materials and a filtering medium through which the air passes. (Fig. 1). The filtering material should be easily renewable, for example, as shown by simply drawing out an air filter element for cleaning or replacement in so-called "throw-away" types.

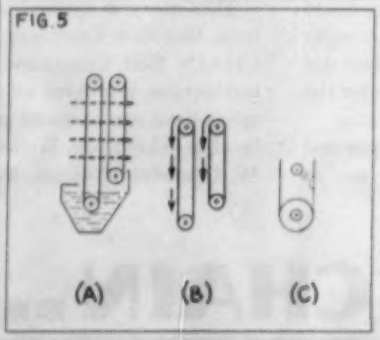
The efficiency of an air filter in actual operation depends, foremost, on its ability to hold back from an air

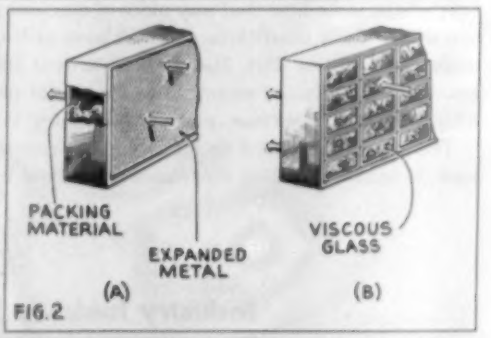
Fig. 1: Air filter in metal frame containing glass wool

stream blown into a space all dirt and dust particles. Mechanical efficiency of an air filter depends on filter resistance to air flow, which latter influences power required for the fan. The rating of an air filter is the volume of air flow for which the filter









Various types of air filters. Fig. 2: Shows two types of viscous filters; (A) using fibrous material between expanded metal, and (B) glass wool as the filtering medium. Fig. 3: Section of rotary viscous air filter with oil reservoir. Fig. 4: Wool felt dry filter, glove type. Fig. 5: Rotary air filters; (A) two endless curtains, (B) curtains travel counter clockwise; and (C) air jet cleaners. Fig. 6: Side and end elevations of air washer used for air filtering

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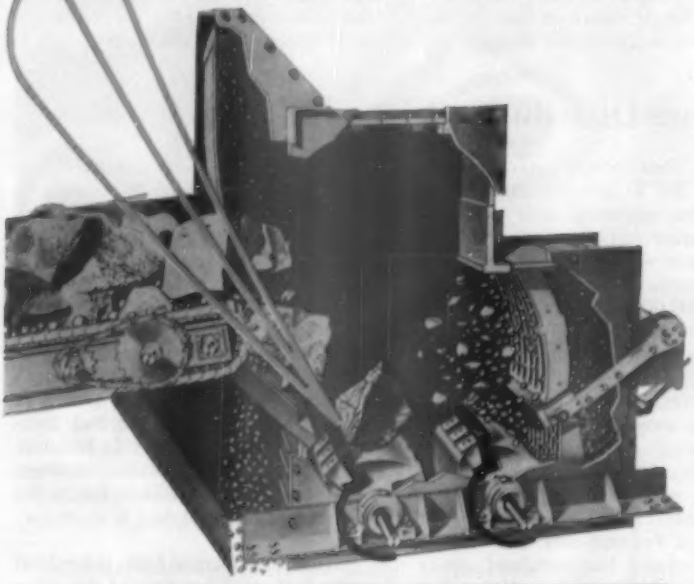

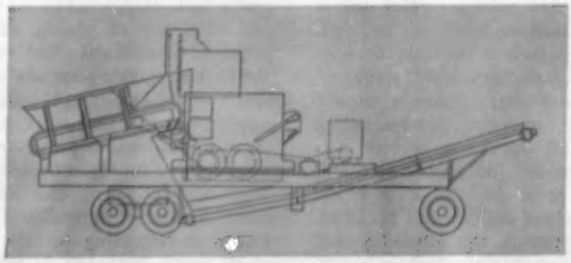

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has to be designed. By dividing the air volume through the air duct area, the free velocity of the air can be obtained, which may be for forced ventilation between 250 to 300 f.p.m.

The resistance of air filters is usually measured in inches water volume, and the fan motor has to be dimensioned to have adequate power. Air filter efficiency can be expressed by the simple formula $E = \frac{D_1 - D_2}{D_1}$ whereby D_1 = amount of dirt or dust per cu. ft. uncleaned air, and D_2 in clean air.

Classification of Air Filters

A broad classification of air filters for ventilating purposes is as follows:

(1) Viscous filter, using an oily surface for catching dirt from a passing air stream.

(2) Dry filters, having a dry surface, such as paper, fabric, etc.

(3) Air washers, as used in air conditioning, whereby spray water is used for washing out solid particles from an air stream.

(4) Centrifugal devices, such as air cyclones, etc., and

(5) Electrostatic precipitators, using an electric field which holds dust particles.

In "viscous" air filters, the filtering material is usually a fiber pack, or for automatic types a series of metal plates. The name "viscous" implies that the filter surfaces have to be wetted with a viscous substance, such as oil or grease, which acts on the flypaper principle and catches the dust particles which come into contact with it. In modern types, the air stream is broken up into smaller streams, which are forced to change direction abruptly a number of times. This throws solid particles against the adhesives, and makes them stick, as the cleaned air flows through.

The fiber used in filter elements can be glass fiber, metal wool, or wire screen, or small filter ferrules can also be used. Fig. 2 shows two types of viscous filters.

Moving Filters

A rotating self-cleaning viscous filter type for manual operation is of the all-metal type using oil-covered surfaces. Normally once in 24 hr. a handle is turned, lowering a used element into a cleaning bath at the bottom. Another type uses oil sprays for heavier filter duties for cleaning the element, (Fig. 3). To avoid manual handling, fully automatic filters with moving filter element have also been designed, and they are supported on rollers and move slowly and continuously across the air stream by means of a motor drive. In other types a series of special metal frames are mounted on a pair of chains, and the elements are moved by a motor drive as a continuous curtain up one side and down the other side of sprockets, which support the chains. Resistance of these automatic filters will generally remain constant during operation, whereas filter resistance of ordinary viscous filters increases with their continued use.

Dry Air-Filters

The usual filtering substance for dry types of room air filters are fabrics or fabric-like materials, as shown in Fig. 4.

A very useful air conditioning and filtering unit, showing a self-contained design, uses glass filters in the same housing made from sheet metal which enclosure also contains the fan. Obviously, for more delicate operations using air for ventilation, or space cooling or for warm air drying the combined unit has advantages over a simple fan. The air enters an inlet on top of the fan case, is drawn through the filter and discharged in clean condition from a second opening on top. Inlet air is usually taken from outside the room. Essential requirements of an efficient dry air filter are good design, sound construction, efficiency in filtering, low maintenance cost, and easy cleaning or replacing of elements. (Fig. 5).

Air Washers — Electrostatic Filters

The cleaning capacity of water mist is utilized in air washers, as shown in Fig. 6. Several types are built for cleaning purposes, at the same time providing cooling of the air stream. Some types of filter washers employ filter pads in conjunction with water sprays. They can be designed for cleaning and humidifying air, and are able to remove all dirt and dust to micrometric fineness.

Electric precipitators are available in both non-automatic and automatic types, and are made in various capacities. Electrostatic air filters have come into wide use during the last years because of their high efficiency.

Agstone Distributor Gives His Views

A NEW YORK STATE DISTRIBUTOR: "We are a farmer's distributing cooperative, operating with a service motive paramount to all other considerations and we are not producers of lime products. We distribute approximately 400,000 tons of agricultural products, predominately pulverized limestone. Eighty-five percent of this is spread by our locally owned and operated retail dealer spreading services. Our sources of supply number approximately 14 and are quite strategically located in or adjacent to our territory, namely New York State, New Jersey, and the northern tier counties of Pennsylvania.

"Our volume has remained steady for the last two calendar years and is the highest that we have ever enjoyed. This trend, which is contrary to consumption figures, generally results, I believe, from our system's locally owned and operated limespreading services. This spreading service gets the job done for the farmer at about the same price he would pay for bagged limetone delivered to his farm. In most instances, the job is as well or better done than the farmer would do it.

"Our volume has reached a high plateau during 1953 and 1954. We anticipate an increase in 1955 due to a few new spreading services, the replacement of a few obsolete spreading units with new modern ones, and due to the enlarged ACP funds for 1955. In other words, we hope to get our share of the business and maybe a slightly increased share. It seems safe to say that the better, more efficient farmer is continuing to use limestone in spite of a dropping farm price level. We attribute the shrinkage in tonnage more to the inefficient, marginal, part-time farmer than to the interference from the mandatory soil test and so-called red tape of the ASC program.

"Our spreading service embraces the spreading of limestone and fertilizer. From several of our 11 fertilizer plants we spread appreciable tonnages of straight mixed fertilizer, but in the main, fertilizer spreading is secondary to limespreading.

"An unsatisfactory farm price level and a lack of conviction of the value and efficiency of liming will be the principal handicaps for volume in 1955. The growing impact of Vo-Ag and college agricultural teaching, extension county agent work, a good agricultural radio and press coverage on the need for liming is bringing results. With a good farm price level and a good market for agricultural products, liming is beginning to take its place along with fertilizer as an efficient farming tool. The man who is already convinced of the value of liming material is using it in spite of an adverse price level and irrespective of the ACP.

"In my personal judgment it is time for the agstone industry to grow up and stop leaning on the crutch of federal subsidy.

Another Example of Continental's Belt Conveyors at Work -

The Southern Cement Company's conveying and elevating system in their Birmingham Plant incorporates several advanced features of design—one of which is illustrated above and to the right.

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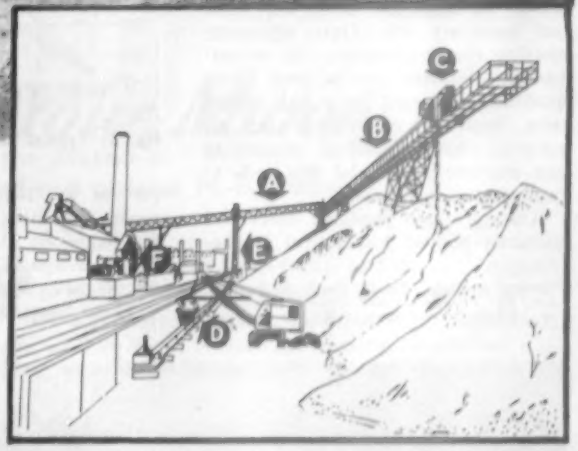

Slag is carried to storage by Conveyors A and B and discharged to storage at any point by self-propelled Tripper, C. As material is needed for processing, it is loaded by shovel onto Reclaim Conveyor D, raised by Bucket Elevator E, and discharged onto return side of Conveyor Belt A., which delivers it to Plant F.

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Specifications for
Concrete Aggregates In California

By E. L. HOWARD*

Fig. 1: Excavating and loading in sand and gravel pit at Kerlinger plant, Pacific Coast Aggregates, Inc., near Tracy, Calif.

I WILL NEVER FORGET my first visit to a gravel plant. Excavation was done with Fresno scrapers and mule teams. A grizzly made of old rails, a small jaw crusher, and a long steep chute with punch plate bottom, sized the aggregates into sand and gravel. The bunkers straddled the Shortline's spur track. Cars were loaded as fast as the mules could scrape.

Mules cannot keep pace with today's production schedules. Fifty-three million tons valued at $45,000,000 is the conservative report for California concrete aggregates in 1953. We could build four Shasta Dams with one year's production. We take our aggregates from stream beds, flood plains and "Tomato" patches, Fig. 1. No longer do we use aggregates as nature provided them, nor will just any deposit fit our needs. Sampling and testing a new area for possible use as an aggregate is an expensive but necessary job. Only aggregate meeting the requirements for soundness and durability can be used. These qualities, measured by a half dozen tests, must be inherent in the pit material. No amount of processing can improve a material that fails to meet these requirements.

The aggregate producer faces two variables beyond his control in producing a saleable material: first, he must cope with changing conditions in his deposit; second, he must keep abreast of the constantly changing specifications.

An example of these changing specifications is highway concrete sand. In 1930, we made a coarse sand with about 30 percent passing the 30 mesh. Ten years later, in 1940, a finer sand was specified. For several years 37-55 percent was required to pass the 30 mesh. But, now we are making the fine aggregate like the coarse sand of 20 years ago, 25-45 percent passing the 30 mesh, Fig. 2.

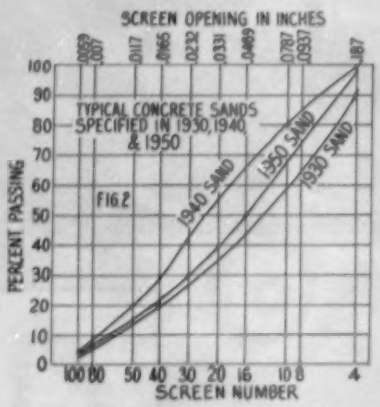

Fig. 2: Typical concrete sands specified in California in 1930, 1940 and 1950

These varying specifications affect producers differently. Ten years ago one plant on the American River blended a fine imported sand to the normal river material to produce the highway sand. Today, with the coarser specification an acceptable fine aggregate is made from the normal production. A plant at the other end of the valley, on the San Joaquin River, has had a different experience. Because their deposit has plenty of fine sand they find the new specifications more difficult to meet.

Included in all the changes in concrete aggregate specifications one thing the producer can be very sure of is that the silt and clay will be limited more and more. Each year brings new limiting controls on the material passing the 200 mesh. Except for the rare fellow with the perfect deposit, the aggregate producer is constantly adding equipment for scrubbing and washing as these standards change. Old mills and new ones must make provision for handling materials with a minimum of breakage. Moisture in sand must be controlled and kept uniform. The ever tightening controls on the quality of the aggregates have caused plants (Fig. 3) to expand and improve their facilities for grading, washing, and loading.

Each producer must plan his operation with the source of supply and the demands of his market in view. The extent of the equipment needed to prepare an aggregate for sale depends upon the amount of clay and the particle size distribution in the deposit. Of great concern to the producer are the kinds of aggregate used in his anticipated market.

In the San Francisco Bay area much of the concrete work is done by federal, state, utility, and similar agencies. Each agency has its favorite type of aggregate. In all, seven coarse

Fig. 3: Loading operations in Kerlinger plant

*Testing engineer, Pacific Coast Aggregates, Inc., San Francisco, Calif. From a paper presented before the American Mining Congress.

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Fig. 4: A medium sized modern gravel plant in California

aggregates and five sands are specified.

Only a plant capable of closely divided particle sizing (as many as 12 size fractions) can make these many present day specified materials.

Such a plant must have blending systems and technical controls to keep inside specifications. Usually the smaller gravel plant will produce two sizes of concrete gravel and one sand. As the deposit changes, the grading of the finished aggregate will vary. Only with a just right deposit can a smaller plant fit their material into a closely controlled specification. Yet, there is a substantial market for the aggregate from the smaller plant. A great many fine buildings have stood for years, made of concrete from these three material plants.

The producer of concrete aggregates moves his product to market by rail and highway transport. Most of the concrete batching plants receive aggregates by truck. Each time aggregate is moved, breakage and contamination is increased. The amount of breakage due to handling in and out of stockpile, Table 1, can easily put an aggregate outside of specifications. Concrete aggregates, loaded wet and delivered by truck lose very little moisture as compared to rail delivery. This moisture, Table 2, causes no end of trouble to the concrete man.

Inform any production manager that he has a shipment of aggregate rejected and he starts looking for the "whys" and "howcomes" but fast. Production people always have a fear of the come-back-home aggregates. The wise producer tries to keep informed about his material quality before it is shipped. Testing is an expensive business but is cheaper, if done in time, than loss of material on the job site, shown in Table 3.

An aggregate producer is mostly afraid of those tests that he is not equipped to make. He seldom can afford the equipment found in large agency laboratories. He needs test methods that are workable in his production schedules. There is room for some cooperative work between the test inventor and the producer.

•

LYBARGER GRAVEL CO., Geneva, Ind., has added ready-mixed concrete facilities to its sand and gravel operations. Lee Lybarger is owner and operator.

TABLE I: GRADING CHANGES OF 1½ x ¾ AGGREGATES DUE TO HANDLING

Sieve	Specifications on Job	Percent Passing at Mill	Percent Passing at Stockpile	Percent Passing at Batch Plant
1½	90 - 100	100	100	100
1	20 - 55	40	31	59
¾	0 - 15	8	14	18

TABLE II: MOISTURE CHANGES IN SAND FROM MILL TO BATCH PLANT

Method of Shipping	By Rail	By Truck
Moisture at Mill	12.5%	11.2%
Moisture at Batch Plant	6.5%	9.7%

PACIFIC COAST AGGREGATES, INC.

TABLE III:

	SAND		WASHED GRAVEL										
% Passing U. S. Sieves	Old Concrete	New Concrete	2½ x 1½	1½ x 1	1 x ⅜	½ x ⅜	⅜ x #4	1½ x 1	1½ x ⅜	¾ x ⅜	⅜ x ⅜	Crusher Run Base	Untreated Rock Base
Inches 3			100										
2½			94										
2			71										
1½			17	96				94	95			100	
1¼			6	79				62	77				
1				27	97			11	43	100		87	100
¾				5	72			2	9	95	100	73	94
½					32	94				45	89		
⅜					12	49	99			18	23	50	64
¼					3	7	73			3	2		
Mesh 4	99	98				2	35					43	53
8	85	82					4	— These materials are not —					
16	67	60					2	produced at present.				33	38
30	43	35											
50	19	14										18	15
100	5	4											
200	2	1										4	4
Fineness Modulus	2.82	3.07	8.63	7.99	7.16	6.49	5.60	8.04	7.96	6.87	6.77		
Specific Gravity	2.68	2.68		2.76	2.75	2.74	2.72						
% Absorption	1.06	1.00		0.98	1.20								
Organic Impurities	ASTM #1	ASTM #1+											
Mortar Strength													
% Standard ASTM	103.8	106.0											
Sodium Sulfate													
% Loss ASTM			Average For All Gravel 3.2% Loss										
% Loss STATE			Average For All Gravel 24% Loss										
Los Angeles Rattler			Average For All Gravel 29% - 500 Rev.										
Loose Weight (Moist) Cu. Ft.	87.0	86.0		98.0	94.5	96.9	88.9			95.7	91.4	112.4	110.6
Cu. Yd.	2350	2320		2650	2550	2590	2320			2590	2470	3040	2990
Rodded Weight (Dry) Cu. Ft.	102.7	103.5	89.8	106.5	104.1	99.7	94.9			103.3	96.9		
Cu. Yd.	2770	2800	2430	2930	2810	2690	2560			2790	2620		
Sand Equivalent	82	82										49	70
Calculated "B" Value												83	81
CBR Min. Value												112%	104%
Mill Screens Passing C.O.	⅛	⅛	3	1⅝	1⅛	⅞	⅞	1⅝	1⅝	⅞	⅝		
Retained C.O.			1⅝	1⅛	⅞	⅞	7m x ½	1⅛	⅞	⅝	⅜		
Wire Size				.283	.148	.148	.080	.283		.148	.148		

*Pacific Coast Aggregates, Inc., six months' laboratory test, Lemon Cove Plant

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Agstone Needs with Nitrogen Solutions

THERE HAVE BEEN STRONG GAINS in the use of sulphate ammonia, Uramon, ammonium nitrate, anhydrous ammonia and other nitrogen solutions during the past few years. All these nitrogenous fertilizers have the property of producing acidity in the soil and can have detrimental effects unless proper amounts of agricultural liming materials compensate for the effects.

According to N.A.L.I. figures, there were 1,584,000 tons of these fertilizers used in 1953, and there was an increase of 12 percent to 1,754,000 tons in 1954. Further increases in their use may be expected. Greatest increase by far has been in the application of anhydrous ammonia.

The relation of the use of such fertilizers to the needs for liming materials is viewed by agronomists as follows:

"According to our present knowledge of the facts of soil fertility and plant nutrition your surmise is correct, namely, that more limestone will be required as more anhydrous ammonia is used.

"When we view the soil's stock of nutrients required as a reasonably well balanced fertility supply for crops, we feel that the soil's exchange capacity, or its power of retaining exchangeable nutrients, should be stocked with calcium to as high a degree as 70 to 80 percent. Magnesium should occupy 5 to 10 percent of that capacity. Thus in these nutrients which we apply in limestone; namely, calcium and magnesium, we must put on enough of them to saturate 75 to 90 percent of the soil's holding power or exchange capacity. In contrast when we use ammonia, which is put on to the soil to be caught up and held similarly in company with the calcium and the magnesium, we apply less than one percent equivalent of the soil's exchange capacity. You can see, then, that it takes much limestone to fertilize with calcium and magnesium in balance with the applied anhydrous ammonia if that soil is to be a balanced plant food source. Yes, then, more anhydrous ammonia, or more crops, calls for more calcium and magnesium and more of all the other fertilizer elements too. When we are using a *plant* fertilizer like nitrogen, we must make certain that we also use plenty *soil* fertilizers like calcium, magnesium, potassium, phosphorus, and all the others.

"If we say that the use of anhydrous ammonia calls for extra limestone too, we must not read in the inference that the two must go on together. We would make a mistake by mixing ammonia or its salts in contact with limestone as an application. This combination would cause the nitrogen to pass off as gas and be lost. Ammonium nitrate, sulfate, or other salts react with the calcium carbonate to give ammonium carbonate (baker's hartshorn) which used to be a leavening agent, and breaks down very easily at high temperatures and does so at low temperatures. So when we say that we need to use more limestone with anhydrous ammonia we do not mean that they should be used together or even be in contact within the soil. We mean to say that when we use anhydrous ammonia the soil should have previously been well stocked with limestone.

"As to the amount of limestone per amount of anhydrous ammonia considered, each 34 lb. of ammonia would be offset by 100 lb. of pure limestone. For convenience and reasonable accuracy, we might well say that each pound of anhydrous ammonia calls for three pounds of calcium limestone as its equivalent." — Wm. A. Albrecht, chairman, Department of Soils, University of Missouri, Columbia, Mo.

"Over a period of many, many years, experiment station workers have consistently shown that the ammonia forms of nitrogen carriers do increase the acidity of the soil and of course thereby increase the need for liming. Certain manufacturers of some grades of mixed fertilizers have been using enough pulverized limestone to compensate for the acidic effect of these acid residue carriers. Many companies advertise their fertilizers as 'physiologically neutral' but for some crops such as potatoes, blueberries, the farmer prefers a physiologically acid mixture.

"So far as the use of anhydrous ammonia is concerned, I do not consider that this is a very important factor. It would take a tremendously large application of ammonia to require any appreciable amount of liming materials for its counter-effect in correcting acidity produced. Over a period of years, true, continuous use of ammonium sulphate or anhydrous ammonia will increase somewhat the need for limestone. Let's say about 300 lb. per acre of ammonium sulphate are applied. That would require the equivalent of about 350 lb. of pulverized limestone to neutralize the effect of this ammonium sulphate. The acidifying effect of anhydrous ammonia is considerably less than for the sulphate carrier of ammonia and does not affect appreciably soil reaction. Liming is so cheap and furthermore is applied at relatively high rates per acre so that a slight lowering of the pH of a soil is quickly neutralized by the limestone contained in a soil that has been limed. True, if any of the ammonia carriers of nitrogen are used continuously over a period of many years and no liming is applied, the acidity of a soil would increase to the toxic point.

"Based on a table in bulletin No. 482 of the Mississippi Agricultural Experiment Station, giving the effect of various sources of nitrogen on soil reaction, I have computed the amounts of 90 percent liming materials needed to correct the acidity resulting from the application of 100 lb. of the various materials:

Sources of Nitrogen	Pounds 90 Percent Lime Needed to Correct Acidity Produced
100 lb. Anhydrous Ammonia (82½ percent N)	164 lb.
100 lb. Ammonium Nitrate (33½ percent N)	66 lb.
100 lb. Ammonium Sulphate (20 percent N)	120 lb.
100 lb. Uramon (42 percent N)	84 lb.

"Certain other carriers of nitrogen have the effect of decreasing the acidity of the soil — 100 lb. of cyanamid, for instance, would raise the pH of an acid soil and have the same effect as the application of 672 lb. of a 90 percent grade of agricultural limestone — 100 lb. of nitrate of soda would have the effect of an application of 32 lb. of 90 percent limestone." — C. J. Chapman, Extension Specialist, Soils, Wisconsin University, Madison, Wis.

"If liquid ammonia replaces considerable amounts of calcium and other bases on the soil colloids and those replaced bases are leached by heavy rains, then the soil will be more acid after the ammonium ion is oxidized to nitrates or used directly by plants. Theoretically, every pound of nitrogen added to a soil and not accompanied by basic elements has potential acidity equivalent to about 3.5 lb. of calcium carbonate. Thus, the greater the amounts of nitrogen from such sources, the greater the probable need for liming to prevent a net increase in acidity." — B. A. Brown, Agronomist, The University of Connecticut, Storrs, Conn.

"I have no information that would indicate that anhydrous ammonia and liming materials should be used to-

GET HIGH QUALITY AGGREGATE
from low grade sources

WEMCO HMS (Heavy Media Separation) can remove deleterious material such as shale, chert, soft-stone, wood and coal from low grade deposits. The finished product is specification aggregate universally accepted for concrete that must stand up under severe outside exposure. The cost of HMS treatment can be far less than the transporting of material from more distant sources.

A POSITIVE SEPARATION BY PARTICLE DENSITY ALONE

HMS will work wherever there is a known difference in specific gravity between deleterious material and the desired gravel. It floats one and sinks the other. The separating medium is a suspension of fine magnetic particles in water. It can be adjusted to any needed specific gravity. Make-up costs are only two to six cents per ton of aggregate.

WEMCO MOBIL-MILLS ARE YOUR INDUSTRY'S CHOICE

To date every HMS user in the sand and gravel industry has chosen the Wemco Mobil-Mill. It is a complete plant — pre-engineered — pre-fabricated — and of pre-determined cost. It is so thoroughly proven in design that it operates from the first day. It goes up in minimum time and at minimum cost. Then it knocks down and moves on when the deposit is exhausted. The Wemco HMS Mobil-Mill is available in capacities from 5 to 500 tons per hour.

Write today for further information

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Representatives in principal cities of the United States and Canada and in major countries throughout the world.

gether. We do not worry about the acidity value of fertilizers in this part of the country because of the high capacity of our soils to hold lime. The small amount of acidity which occurs from the addition to fertilizers is of little consequence when the soil has the high capacity to hold lime. I would say that only the use of limestone would put the soil into a position where the benefits from the use of anhydrous would be much greater. This is because the plants would benefit having a desirable medium in which to grow." — S. A. Barber, Associate Professor in Agronomy, Agricultural Experiment Station, Purdue University, Lafayette, Ind.

"There are strong arguments to support the fact that liming may increase the loss of nitrogen for the following reasons. By providing a pH of 6 to 7 microbial conversion of ammonia to nitrate is normally increased. Unless there are plants present to use this nitrate nitrogen it is subject to loss by leaching. It is well known that nitrogen losses are increased by an excess of lime in the soil.

"Many of the nitrogenous fertilizers leave the soil acid to some extent. Anhydrous and liquid ammonia are in this category. From a practical standpoint the amount of limestone required to counteract the acidity produced by these two materials is very small. It would take about 150 lb. of limestone to counteract the acidity produced by 100 lb. of anhydrous ammonia.

"The important sales angle is that, except for a few acid soil crops, ammonia nitrogen should not be used on land that is not limed. Your returns per dollar's worth of nitrogen are so much greater on limed land." — R. B. Aldefer, Chairman, Soils Department, New Jersey Experiment Station.

Agstone Status In Illinois

ONLY A FEW YEARS AGO, Illinois farmers were using agricultural limestone at the rate of 5 million tons annually. This was just about enough to maintain the soils of Illinois in suitable condition with respect to lime. With a reduction in this amount to about 3 million tons, there are many acres of soil in Illinois not being adequately limed. The result of this, sooner or later, will be that Illinois farmers suffer. Of course, I think the main factor in this reduction is the effort on the part of industries in the field to compete for the farmer's dollar. The liming industry has never put much emphasis on sales promotion, either individually or through advertising. Consequently, the farmer is being influenced to spend his money for those products which receive strong sales promotion. The lime people, I recognize, have perhaps not enjoyed as large a margin of profit as have some others and therefore have not had the wherewithal to put a sales force in the field and to give a lot to advertising. Nevertheless, I believe that this problem is one which has to be recognized.

"In the past, most liming materials sold through the United States have been sold as a result of education and promotion by educational, research, and extension centers. In Illinois, limestone still pays the farmer more per dollar invested than any other thing he can use, particularly when he uses that limestone to promote growth of legumes and soil improvement. It should appear as a 'first' on his soil improvement program in most cases. There has lately been some tendency to depreciate the value of lime in favor of other soil amendments. This, in my opinion, is very unfortunate—both from the standpoint of the soil and the farmer's income. It is unfortunate, too, in the face of the potential need for other soil amendments and their profitableness.

"Specifically, then, the limestone industry should place as much emphasis as possible on local and national advertising and more emphasis on dealer sales propaganda. Liming in most educational and promotional programs is taken for granted and is usually added as a supplementary comment. In my opinion, liming should be stressed *first*. I am not sure where I stand on the A.C.P. program or the mandatory soil test. In a state like Illinois I doubt that the influence of A.C.P. programs should be given too much concern.

"I believe that limestone should be sold on the basis of its benefit, and the quantities are so much greater than the A.C.P. program can pay for that the latter should be considered as of little consequence. Let the farmer spend his A.C.P. money for some other things. Liming material at the highest price is very cheap. The farmer should not need incentives to use limestone. If the farmer is thoroughly informed about the benefits to be derived from a good liming program, he will use it as a matter of necessity.

"The mandatory soil test in the A.C.P. program is ideal for getting the materials of all kinds into the hands of operators who have never used these materials before. They, in my opinion, are not of much value to those people who have had a good soil management and soil improvement program. One who has had and is carrying on a good soils program has nothing more than a maintenance program to carry on, and the soil tests would tell him only that he did not need additional applications of fertilizers or limestone. Therefore, they would not pay.

"Nevertheless, the maintenance program is just as important to the country, the farmer, and the industry as is the newer prospect. If those farmers who are doing a good job do not continue to do so, their yelds will begin to decline and the productiveness of their soils will deteriorate. In my opinion, the soil test is the greatest promotion vehicle for plant food sales that is available to industry today. Certainly when one takes the soil test and demonstrates to a potential client that he needs materials, it is very easy to sell the client on the product."—A. L. Lang, Professor of Soil Fertility, College of Agriculture, University of Illinois, Urbana, Ill.

Drilling Manual

ROCK HARDNESS, texture, fracture and formations are discussed in detail in a 68-page, pocket-size booklet entitled, "Drillers Handbook on Rock," published by Davey Compressor Co., Kent, Ohio. Instructions on drilling speeds are given, and a "point system" to figure drillability and drilling cost is also outlined. Drilling equipment, ranging from light hand rock drills to large truck-mounted rotary air and mud drills are illustrated and described, and a glossary gives approximately 150 commonly used rock and mineral technical names and terms. The booklet is available from the Rock Drill Division, Davey Compressor Co., at a cost of $1.50 per copy.

National Gypsum Expansion

NATIONAL GYPSUM CO. has begun expansion of its limestone processing plant at Gibsonburg, Ohio, at a cost of approximately $250,000. The expansion will provide facilities for the manufacture of pressure hydrated building products.

Buys Gypsum Deposit

PABCO PRODUCTS, INC., San Francisco, Calif., has purchased a gypsum deposit near Lovlock, Nev., from Ideal Cement Co., Denver, Colo. The company plans to build a gypsum plant there, producing wallboard, lath and plaster, serving northern California.

Dempster-Diggster bucket GETS A FULL LOAD WITH EVERY STROKE!

The hydraulic crowd and hoist operation of the new Dempster-Diggster GRD-101 gives you big shovel advantages in front end loading and excavation work. As shown in the at-work photos at right, here's what happens: Dempster-Diggster moves into material with shovel lowered against front of frame. No wheel traction is used to get excavation power. The hydraulic crowd and hoist moves bucket out and up following contour of material—getting a full bucket with every stroke . . . reducing loading time and idle truck time, thus getting the job done faster!

When you put your Dempster-Diggster into operation, one of the first things you will find is that your entire operation must be geared to a faster pace. This means greater efficiency of equipment and manpower—more profit to you!

Write us asking for Folder No. 3116 giving you complete information on the features of the Dempster-Diggster, including TRUCK-SPEED MOBILITY TO AND FROM JOBS . . . AUTOMATIC BUCKET TRIP . . . MAXIMUM DUMPING AND DIGGING HEIGHT . . . MINIMUM TURNING RADIUS . . . THE SHOVEL WITH TORQUE CONVERTER . . . HYDRAULIC STEERING, etc. Manufactured by Dempster Brothers, Inc.

In photo below camera catches Dempster-Diggster ready to back off and move up to a truck for loading.

DEMPSTER DIGGSTER

DEMPSTER BROTHERS, 365 N. Knox, Knoxville 17, Tennessee

Measuring High Temperatures In Rotary Kilns

By L. W. PASSMORE

MEASUREMENT OF HIGH TEMPERATURES in kilns is based on interferential methods; e.g. on indirect measurement. The science and art of pyrometry has steadily advanced during recent years, from the use of thermocouple instruments and of optical pyrometers to application of electronic tubes for rapid and accurate magnification of minute electric measuring impulses. The most widely used materials for thermocouples up to 1100 deg. C. is Chrome-Alumel, protected by special ceramic sheaths. Below 965 deg. C. temperatures, nickel or chromium alloys can be used in thermocouple pyrometers.

The International temperature scale was generally adopted in 1927, and in the meantime national temperature scale standards have been established in most industrial countries. The science of pyrometry has rapidly and steadily advanced in recent years, and research has produced thermocouple types for industry which meet most practical requirements. Chrome-Alumel up to 1100 deg. C. is probably most widely used, but with oil-firing the sheath must be made from special fire-clay or ceramics, or other compounds. Below 900 deg. C., nickel or chromium alloys can be used. Up to 1700 deg. C., the platinum-platinum rhodium thermocouple, protected by a vacuum-tested recrystalized alumina pocket is preferred. It should be realized in practice, however, that a sheath impervious to gases becomes susceptible to thermal shock if made from refractory material, and another sheath or pocket has therefore to be applied for protection. Extremely high temperatures can now be tackled by more recently developed iridium - iridium rhodium thermocouples, able to withstand both thermal and mechanical stresses.

Temperatures Over 3000 deg. C.

For very high temperatures, optical pyrometers operate either on energy radiated as visible light (and heat) waves, or they use visible plus longer radiant waves (radiation pyrometer).

Space does not allow here to go deeper into the intricacies of the various types of optical pyrometers, a description of which can be found in textbooks and in makers' literature.

What should be pointed out is that several sources of error are obviously always present when using instruments necessitating visual comparison. Since sensitiveness of the eye depends largely upon the time which it has been in the dark, a disappearing filament instrument may deceive its user. Another source of error is location of the focussing lens. Other errors result from the fact that ideal "black body" conditions can scarcely be expected, and it requires a trained observer to achieve 1 percent accuracy of measurement. Filament types are available from approximately 700 deg. up to 4000 deg. C. with normal calibration.

Total Radiation

The limitations of radiation pyrometers are less severe than for filament instruments. By focussing heat radiated from a kiln or furnace charge to a very small thermocouple (500 deg. C. to 3000 deg. C. or higher), a comparatively accurate result can be expected. For example, a tube made from refractory material, closed at one end is at least a protection, and a larger and stronger tube can be used. By letting air into a sighting housing, the air pressure at the screen window on the furnace side protects from soot and fumes. To secure independance over a wider temperature range, an optical system with a lens or a concave mirror is applied to concentrate the heat energy on the hot junction. The fixed focussed pyrometer type permanently focusses an image of the front diaphragm in the plane of the sensitive disc of the measuring element, and adjustment means are provided for so that an overlapping image of the heat source is correctly focussed. The fixed focus type is, therefore, very suitable for portable instruments. Partial radiation pyrometers are sensitive to narrower bands of the energy quick-response pyrometers. They are sensitive to narrow bands of the energy spectrum and use semi-conductors, thermo-piles and photocells. Most practical types can be classified as electronic instruments. Their disadvantage seems to be the need for very close ambient temperature maintenance and frequent recalibration. The modern photocell pyrometer is very satisfactory for measurement of open hearth furnace types, and also for continuous measurement in the rolling mill. Equipped with a limit control switch it is in use for regulation of induction heating and on resistance heating machines.

Installation and Maintenance

Correct installation of fixed instruments, and the proper use of portable pyrometers in kiln processing are most important factors for ease and accuracy of measurement. Regular and planned maintenance in the plant with regular inspection, frequent testing and recalibration is another factor not to be neglected. Measurements of kiln temperatures demand good accuracy, because otherwise quality might suffer, or heat may be wasted, or output may be reduced.

Equipment for checking of thermocouples may consist of: (a) a portable potentiometer instrument; (b) a standard platinum or base metal thermocouple; (c) an electric muffle furnace; and (d) a battery box. For most checking purposes, the high resistance millivoltmeter will be satisfactory. Sometimes a metal bath is used in place of a furnace for checking thermocouples. It is also possible to carry out the check in fixed installations. Times of regular checking may vary from once a week to once every three months, but this depends on actual working conditions and on practical experience.

Defects in thermocouples are easy to detect, and the hot end reaction is the first item to check by means of a test instrument. As the thermocouple deteriorates with age, its e.m.f. falls off, and this should be tested against standard. In practical operation it is essential to make sure that the thermocouple is properly immersed, as intended by the manufacturer, but to avoid excess temperatures. A loose hot junction must be welded together after twisting, and loose or dirty wire connections tightened and cleaned.

Lead troubles can originate from grounds, and can be detected by disconnecting the instrument, using a magneto set. Plus and minus wires of extension leads must be connected to the respective terminals of the thermocouple, and they are not interchangeable against other leads. All joints should be properly soldered, and wires kept away from high potential lines, and also from steam pipes, vibration points, or from danger of mechanical damage.

Many fixed pyrometers are working prolonged day and night periods, causing heavy wear and tear. Frequent cleaning and lubricating of the small moving parts, and using the proper instrument oil is most important. Often the galvanometer instrument needs adjustment, if out of mechanical or electrical balance. Vibration, a dusty at-

(Continued on page 150)

Pace-Setting HD-5G Tractor Shovel

NOW BETTER 3 WAYS

From the time of its introduction seven years ago, the Allis-Chalmers HD-5G Tractor Shovel has been tops in popularity. Many thousands are daily proving their ability and versatility on all kinds of material handling and excavating jobs.

Now, design refinements make the HD-5G a three-way better value than ever before:

1. Has Bigger Rated Capacity

New bucket handles a big 1¼-yd load — streamlined design now helps roll in large loads with less tractor effort. The back of the bucket has been brought forward and the sides extended to cut spillage, put more payload where it's wanted.

2. Helps the Operator Do More

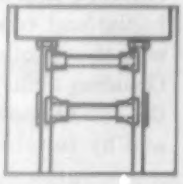
Cleaner dumping with the new bucket saves the operator time and effort shaking out loads.

For added versatility, there is a two-position bucket available with both standard automatic return to digging position and operator-controlled tip-back. If the operator chooses to use the controlled tip-back, he can load the bucket, then tip it back approximately 25° before raising, assuring maximum output under special conditions such as downhill loading or loading loose materials.

The HD-5G helps the operator do more in other ways, too — giving him full vision, fast and easy control, cleaner platform and more comfortable seat from which to work, and more working time with truck wheels, support rollers and idlers that need greasing only once every 1,000 hours.

3. Works at Lower Cost

The HD-5G now works at even lower cost than ever before — not just because it *does more*, but because it has features that mean *less maintenance, longer life.* For instance, new type tubular bracing on the bucket booms provides added strength and support, keeps the bucket in line. The floor at the rear of the new bucket has been raised seven degrees to reduce wear on the bottom sheet. Heavy-duty truck wheels and idlers are available for particularly tough working conditions. One-piece, full-length main frame permits unit construction so that major assemblies can be removed without disturbing adjacent units, putting tractor back on the job in hours rather than days.

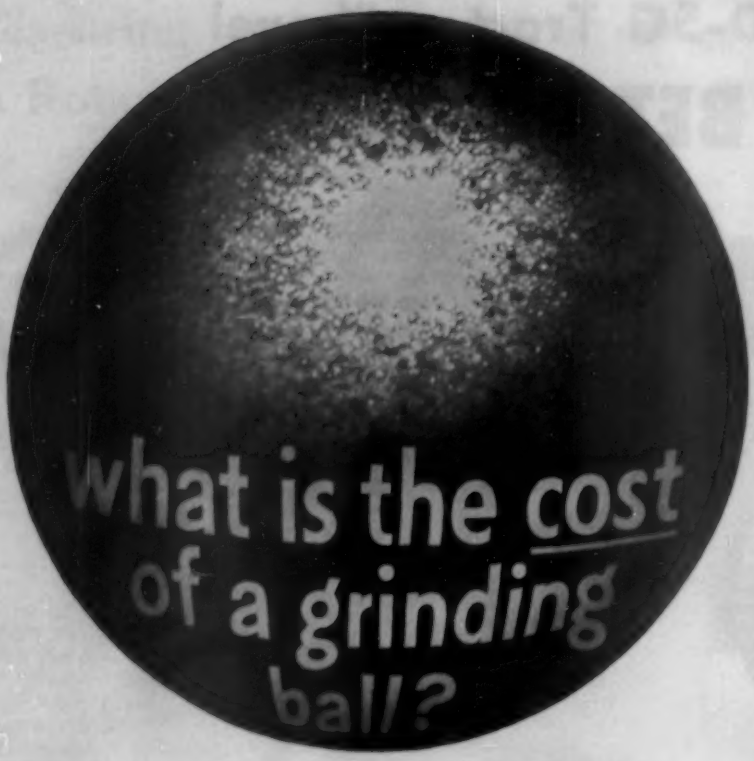


Ten Quick-Change Attachments Add to HD-5G Versatility

Bulldozer	Crane Hook	Tine Fork
Angledozer	Light Material Bucket	Rock Fork
Narrow Bucket	Trench Hoe	— also rear-mounted Ripper
Rock Bucket	Lift Fork	

See your Allis-Chalmers dealer for more about these and other production-boosting features of the popular HD-5G Tractor Shovel.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



The cost of a grinding ball is determined by three things: initial cost, grinding ability and wearability.

You'll find that every CF&I Grinding Ball is your best buy. Initial cost compares favorably with that of other grinding balls. Grinding ability is improved by the use of special analysis steel and by suitable heat treatment resulting in a balance between toughness and hardness. Homogeneity of the balls is maintained, resulting in even wear with self-rationing and a more effective grind. The cost per barrel of cement produced is what really counts. Available in sizes from ¾ inch to 5 inches.

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Rotary Kiln Efficiency

(Continued from page 114)

Fig. 27 presents still another system, the one believed to be best for rotary kilns. In this case, the cooler is used as in the previous instance. There is no preheater. However, the kiln is substantially segmented. The stone and the gas mass are divided into four separate streams; what all this does will be discussed at length later. For the present and the purpose of explaining the diagram, we wish to call attention that while in the previous case with cooler and preheater combined, the hot zone terminal temperature differential was assumed at zero and no loss of high level at "J." In this case some of this heat is lost, resulting in a higher exhaust loss because the aim is to have 190 deg. F. calcining zone terminal temperature differential, a far more practical condition.

This loss, however, is offset by the fact that due to the segments, the kiln for any given capacity will be of lesser diameter, lesser length and lower temperature, resulting in a radiation loss that would be only half or 7.2 percent. With heat consumption at 3.66 million B.t.u. per ton and with other losses added, such as excess air, incomplete combustion, cooler loss, dust loss and water loss, the total is about 4.5 million B.t.u.

Defense Materials System

EXPLANATION OF THE DEFENSE MATERIALS SYSTEM is given in a 41-page booklet, entitled "The Defense Materials System in Our American Industry," published by the Business and Defense Services Administration, U.S. Department of Commerce. Key questions and answers on the essential points of D.M.S. precede the descriptive material and instructions for defense contractors. It is designed as a reference to the general rules applicable to the contractors' and suppliers' defense contract operations. Copies of the booklet are available, at a cost of 25¢ each, from the Superintendent of Documents, Government Printing Office, Washington 25, D.C.

Dust Control

THE NATIONAL INDUSTRIAL SAND ASSOCIATION and the Industrial Hygiene Foundation of America have announced a conference to discuss dust control in the industrial sand industry, June 16, at Mellon Institute, Pittsburgh, Penn. Member companies planning to attend, have been asked to write to the association, listing the engineering and production problems they have found in controlling dust at their plants. These points will serve as a background for the conference.

This Belt Puts Muscle In Your Moving For Heavy Loads

Here's an all-purpose conveyor belt that handles aggregates, gravel, sand, cement, concrete, slag, limestone . . . even coal or bricks. It's tough . . . but it's also flexible. Whether you've got a "carry" of a few feet or a mile . . . regardless of extremes in weather and exposure . . . this belt is one of the best for conveying a variety of tough materials . . . and for long life.

Ebonite-Reliance has a cover tensile strength of 2500 to 3000 pounds average, and a friction pull of 16 to 19 pounds average. Its carcass is formed of multiple plies of highest quality cotton duck, with skim coats between plies. It is also available in the new high tensile cotton, and rayon fabrics. Cover thickness as desired; and a breaker strip, if specified. Mildew inhibited throughout. Can be made in any length, and in widths up to 72".

We also manufacture a complete line of industrial rubber products: belting, hose, packing and moulded rubber for every need. *Through your Quaker and Quaker Pioneer distributor* our research and engineering services are always available to help you solve any industrial rubber problem. *Write for name of distributor.*

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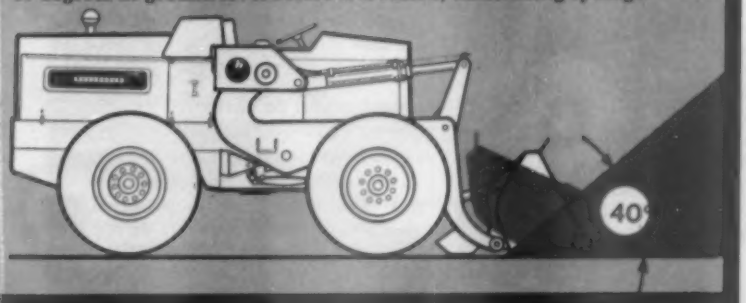
PAYLOADER® TRACTOR-SHOVELS

offer you all these features...

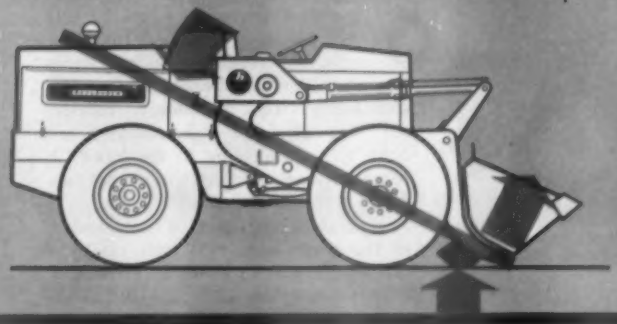
40 DEGREES BREAKOUT AT GROUND LEVEL

You can get HEAPED BUCKET LOADS and you get them FASTER and EASIER WITH THIS NEW BUCKET ACTION. Most important of all—you KEEP BIGGER PAYLOADS—because the bucket can be tipped back a full 40 degrees at ground level before it is raised, eliminating spillage.



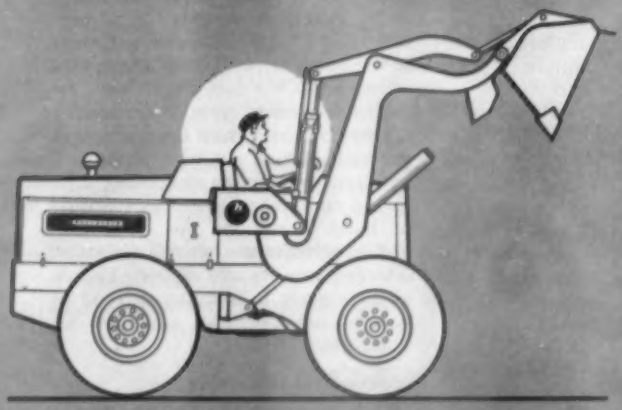
POWERFUL PRY-OUT ACTION

Tremendous pry-out force is obtained by using the breakout pads on the ground as a fulcrum for leverage. The load forces opposing the pry-out action are thus transferred to the ground through the pads instead of to the axle, wheels and hydraulic system of the machine.



SAFETY AND STABILITY

Underslung boom-arm design keeps moving members out of operator's reach at all positions—without using safety guards and screens. Longer wheel base and close, low, load-carry position provide maximum stability and balance.



HOUGH-DESIGN
HOUGH-QUALITY
HOUGH-PERFORMANCE

more horsepower

per bucket capacity than any other wheel tractor-shovel. Either gasoline or diesel power available.

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Fullest operator visibility for safe, fast maneuvering; power-steering; minimum number of control levers. Foam-rubber molded seat and back cushions. Seat adjustable for operator comfort. Longer wheelbase and better balance add to riding comfort.

accessibility

Unusual accessibility for servicing and maintenance. Battery and oil reservoir are located under an easy-access cover just behind driver's seat. Sealed grease fittings. Exterior hydraulic line outlet provided for easy addition of hydraulically-operated accessories.

torque-converter drive

in conjunction with 4-speed, full-reversing transmission provides precise, easy control and the widest possible range of speeds for both forward and reverse. Acts as a shock-absorber for the entire power train.

other features

Closed, pressurized hydraulic system to keep dirt and air out of oil; powerful hydraulic brakes; double-acting hydraulic cylinders and chrome-plated piston rods; 12-volt electric systems on gas-powered models; forward and backup driving lights; tail lights.

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[illegible] Libertyville, Ill.

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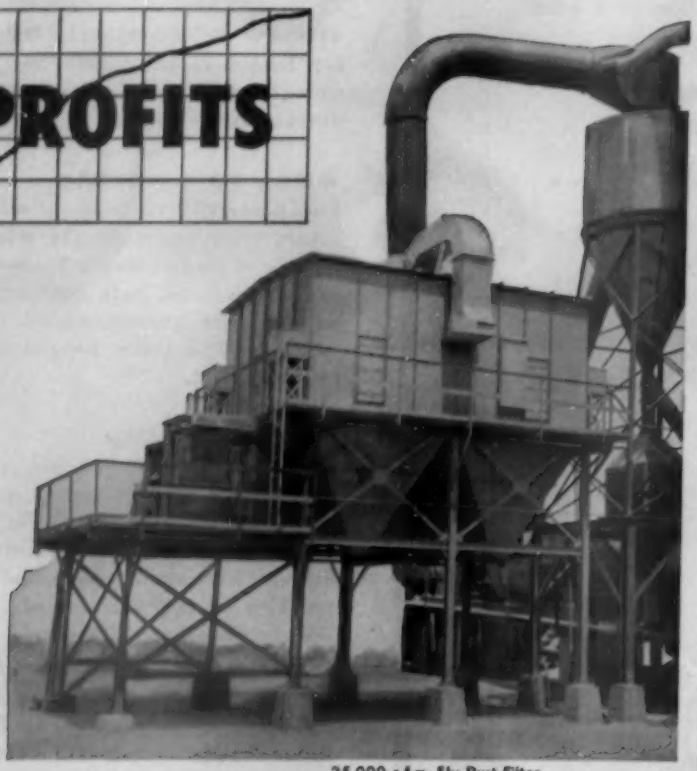
SLY turns DUST into PROFITS



25,000 c.f.m. Sly Dust Filter
Collecting 10 Tons of Valuable Dust per Day

THE PLANT of the Buffalo Crushed Stone Corporation produces a wide range of hot-mix and cold-mix specifications.

In an average day's run of 700 tons, the Sly Dust Filter, shown above, collects 10 tons of dust — used as a mineral filler in certain sheet asphalt specifications.

By reclaiming this fine dust, the Sly installation pays a profit and at the same time provides a cleaner plant and better working conditions.

These earnings are typical. Hundreds of Sly Dust Filters are creating profits in the production of crushed stone, cement, gypsum, limestone, feldspar, fluorspar, bauxite, etc.

Expertly designed and built, Sly Dust Filters offer many advantages in greater filtering capacity, easier bag replacement, automatic control, and other features which spell low cost operation.

May we tell you more about Sly for your particular application?

Manufacturers of: Dust Control Systems, Blast Cleaning Equipment, Tumbling Mills, Industrial Ovens.

THE W. W. SLY MANUFACTURING CO.

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New York • Chicago • Philadelphia • Rochester • Birmingham • Cincinnati
Buffalo • St. Louis • Minneapolis • Detroit • Denver • Los Angeles • Toronto

PIONEERS AND LEADERS IN INDUSTRIAL DUST CONTROL

Calcining Reactions

(Continued from page 106)

ods such as those which have been used for the ternary system are not adequate when the number of components is increased. The method of computing phase composition; that is, composition expressed in terms of the phases present, will be described in a coming issue.

Hydration of Lime

(Continued from page 94)

phenomenon has never been systematically investigated. This influence of the carbonate has been known from the earliest days, and it is one of the reasons for the former belief in the existence of a basic carbonate: a belief held by as distinguished a chemist as Michael Faraday.

Hydration of high-calcium lime for use in mortar and for plastering was formerly always carried out in excess of water. Lump lime was placed in water, stirred by hand to keep all reacting lime thoroughly wet, and the resulting cream-like liquid was generally decanted through a sieve to the lime pit, where it remained for days or weeks to complete its hydration and to stiffen to the consistency of soft butter. This procedure, carried out with care, gave satisfactory results, but, in addition to the labor, it required considerable space, not always available on a building site.

Hydraulic limes cannot be hydrated in the same way. Not only do they fail to disperse in water to provide a cream which can be dealt with in that way, but also, if left soaking with water, they lose their hydraulic set. They were therefore generally hydrated by wetting with sufficient water, piling into heaps, and covering with sand to conserve the heat; and magnesium limes were often treated in the same way. Needless to say, this method of hydration depends for its success on the experience and judgment of the operator, without which failure is frequent.

The hydration of pure limes to a dry hydrate, as a hand operation, was generally carried out by applying water from a hose to the lump lime spread on a floor, sometimes followed by hand sifting, and this crude procedure is still in use in some countries. The disastrous results of using hydrated lime made in this way delayed its general use in those countries for many years.

Mechanical Hydration

The adoption of mechanical hydration, followed by reliable air separation, resulted in the production of a material which not only had the same convenience of handling, storage and

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use as portland cement but which could be covered by a specification ensuring its reliability in use.

It is an interesting fact that the three early hydrators to be widely used all closely followed the design of equipment which had already been developed for quite different purposes. The Clyde is essentially a pan mixer or mortar mill, without the rollers, the Kritzer follows closely the design of the Hasenclaver machine for the continuous absorption of chlorine in making bleaching powder (known since 1888), and the Schaffer is practically a low temperature version of the Wedge Herreschoff ore roaster. The design of each of these hydrators, and also that of the Schultess, the first European hydrator, have remained almost unchanged since their introduction.

What are the functions of the hydrating machine? One purpose is to measure lime and water and blend them, and some hydrators have been confined to these functions. Indeed, hydrators are still in use in Germany which do nothing else. The mixture of crushed lime and water is dumped in silos where the process of hydration for the most part takes place. The quality of the hydrate made by this process is such that it is unlikely to be used elsewhere.

As long ago as 1925 Carson (U.S.P. 1,244,421) produced hydrate by a similar process, but he ground the quicklime finely before mixing, thus avoiding segregation of the two components in the silo, and there is a possible field for such silo hydration, in dealing with impure limes, which will be mentioned later.

These methods of hydration ignore the important function which a hydrator should perform of dissipating the excess energy of hydration. When a pure lime is hydrated there is enough heat generated to evaporate a quantity of water about equal to that of the water which combines with the lime. If the excess heat is not removed the temperature in the hydrator rises, the quality of the hydrate is lowered and the reaction may come to an end far short of complete hydration. In all hydrators, therefore, excess water is added so as to dissipate the excess energy by evaporation, and one function of the machine is to provide the conditions and the time necessary for evaporation, as well as for hydration.

The hydrators already mentioned provide continuous agitation of the lime and hydrate in a relatively thin bed so that the stirring mechanism is never called upon to plough through the thick mass of material. In the continuous machines their total enclosure ensures that there is an atmosphere of

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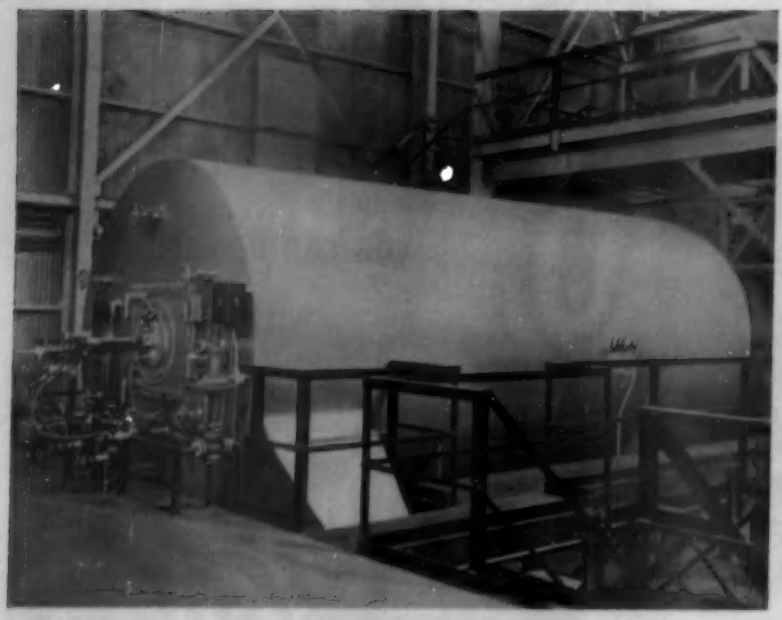

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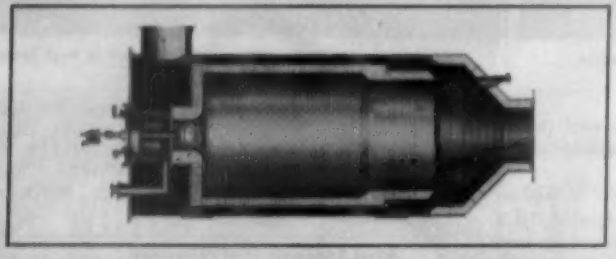

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almost pure steam above the lime in the machine, the steam flow being counter to the lime flow and escaping near the point at which lime and water enter.

The success of these hydrators, particularly that of the Kritzer and Schaffer, over a long period of years, shows that they carry out the operation successfully, but they necessarily depend for success either on having a uniform lime which hydrates rapidly and uniformly or in providing large hydration space per unit of lime hydrated. Since the lime passes through these plants in a uniform continuous stream, the total time of passage is practically the same for all particles, but even the best lime varies in its rate of hydration, and commercially produced lime—with the possible exception of that made in a fluidized bed—contains pieces which take more than ten times as long to hydrate as the average time of hydration. All such pieces and many others of intermediate quality, passed through a hydrator designed for a time of passage based on the average rate of the sample, would be discharged in an unreacted or incompletely reacted condition.

(To be continued)

Rocky's Notes

(Continued from page 49)

one we are primarily interested in. It contains within a very small compass, it seems to us, just about all the essential information necessary to an understanding of portland cement composition. Since the actual chemical structures of the calcium silicates were unknown (and still are unkown) this part of the book is less specific than that on metals whose structures are known. We are much encouraged by his explanation of the chemistry of hydration of portland cement, because here is expert opinion along the same lines we published a few years ago. This is that hydration of the cement particles is caused fundamentally by the hydration of the included lime (CaO) as such. He writes: "A reasonable general approach to the behavior of the compounds in portland cement in water is to consider that these are sufficiently rich in lime to retain the strong tendency of lime itself to undergo hydration, but that this is restrained sufficiently to prevent expansion in setting or in the hardened mass." He had previously explained that lime has no cementing properties because: "If quick lime is made to a paste, each particle hydrates so quickly that its products are unable to expand into pore-space, but press against those of adjacent particles. Consequently, instead of a small shrinkage [necessary for cementing properties],

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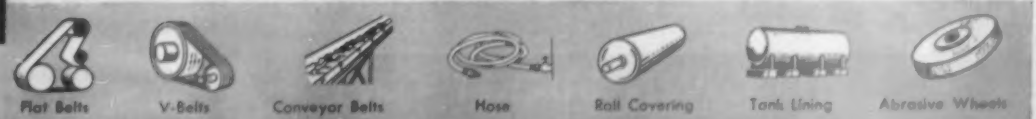

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there is rapid expansion and, under such conditions, cohesion is impossible."

Dr. Carman brings out another point that interests us greatly. He says: "In $3CaO \cdot SiO_2$ [tricalcium silicate], the ratio of Si:O is 1:5, and since each silicon ion can only be coördinated to four oxygen ions, this means that one oxygen in five is coördinated to calcium only; i.e. the formula is $Ca_2O \cdot SiO_4$. The oxygen ion is thus in the same invironment as in CaO and tends to react with water in the same way. The reaction will naturally be less violent than in the case of lime [alone], and, in addition, precipitation of silica as a hydrated calcium gel inhibits diffusion of water to the unhydrated portions, so that the rate of reaction slows down and comes to an end in the hardened mass."

We once suggested in these columns that the hydration of a cement particle began with the hydration of the lime as such, and that it was the disrupting effect of this violent reaction that reduced the cement particle to colloids. The same idea seems to be inherent in the sentences quoted above. Moreover, we think his statement that the hydration of these unattached, or loosely attached, ions or molecules of CaO comes to an end in the hardened mass might well be questioned. It is stated elsewhere, and it is generally accepted everywhere, that cement goes on hydrating indefinitely if water is available. Hence, how do we know that this unattached lime does not eventually hydrate with expansive and possibly destructive effects? Again, it seems to us, there may be good reasons to doubt that modern portland cements with high $3CaO \cdot SiO_2$ contents make as permanent or durable concrete as the well-made older cements in which the percentages of C_2S and C_3S were reversed.

Fuels

Most of the rest of the book is not of such direct interest to our readers, but the three chapters on solid, liquid and gaseous fuels are. As among the largest industrial users of fuels of all three types, the cement and lime industry personnel should know a great deal about fuels. Here in a limited space is information that would be helpful to chemists and purchasing agents responsible for the procurement of fuels, and to operators who should know how to use them for the best efficiency.

•

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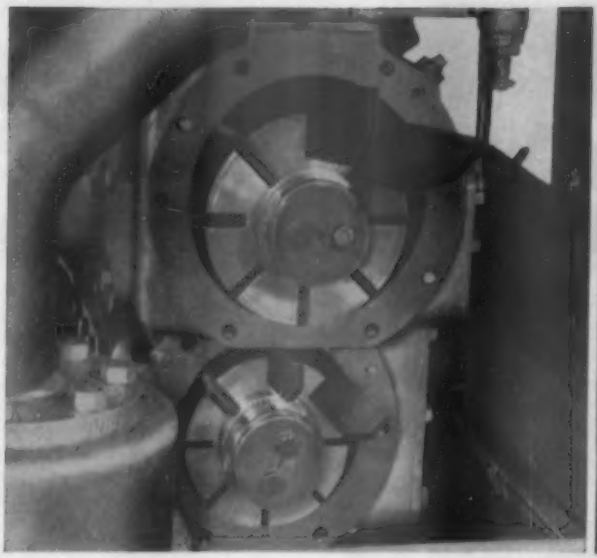

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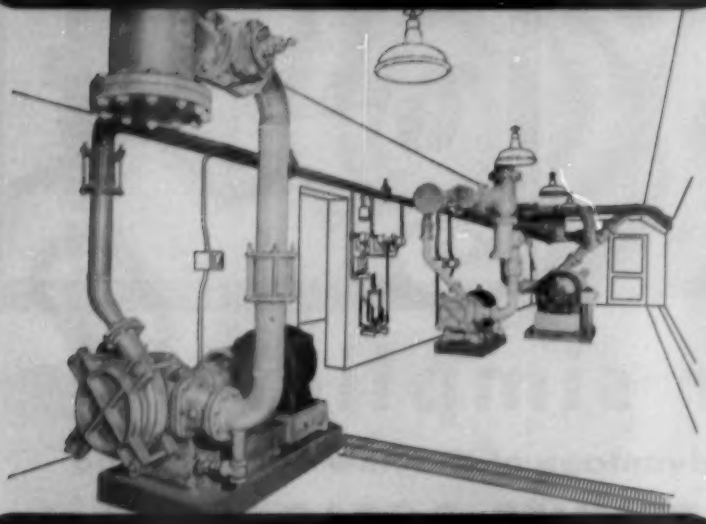

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Labor Relations

(Continued from page 51)

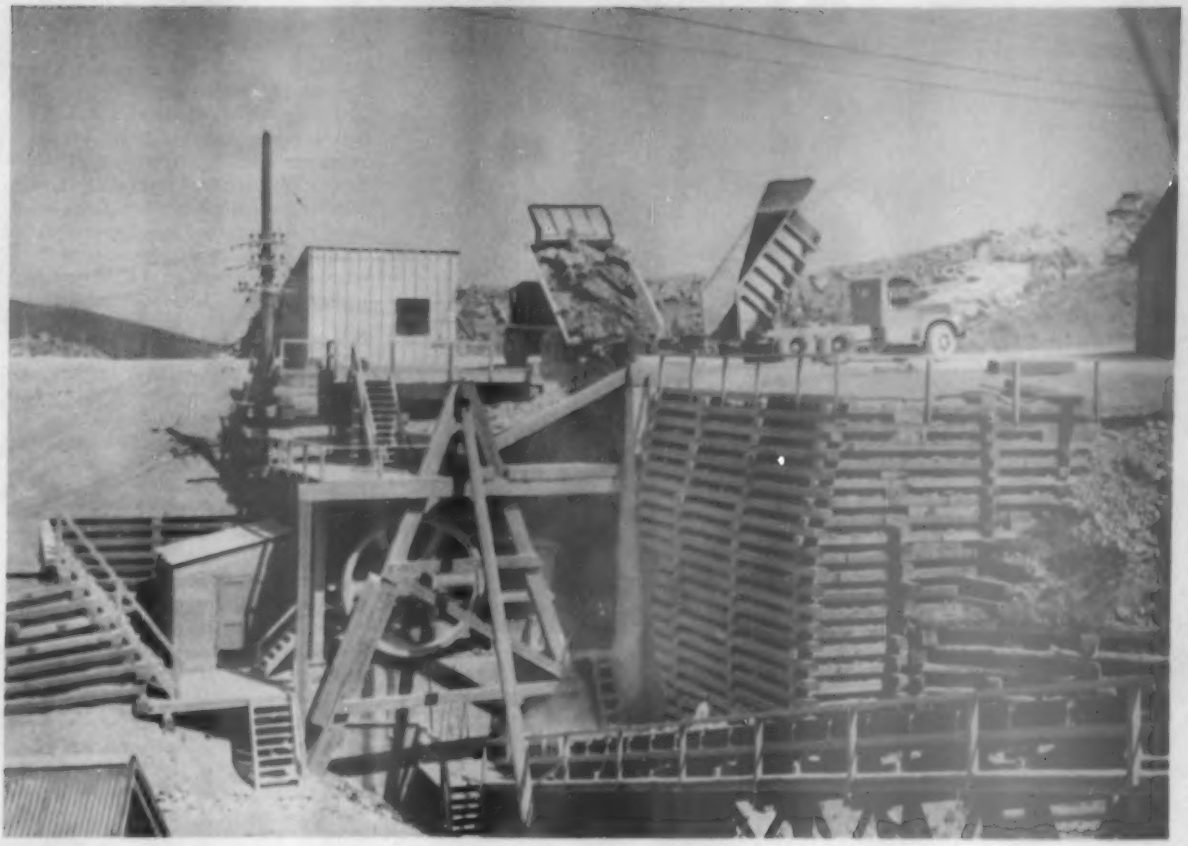
thereby '* * * restrained and coerced their employes in the exercise of rights guaranteed by Section 7 of the Act, and discriminated to discourage membership in the union, thereby violating Section 8(a)(1) and (3) of the Act.' The Board also concluded that the respondents by consenting to individual bargaining had abandoned their right to resort to economic lockout. Further facts will be developed during the course of this opinion.

"The Board in seeking enforcement of its order has abandoned its contention that the respondents were not entitled to lock out their employes solely for economic reasons in view of the decision of the Ninth Circuit in Leonard v. National Labor Relations Board, 9 Cir., 205 F.2d 355, and the decision of the Seventh Circuit in Morand Bros. Beverage Co. v. National Labor Relations Board, supra, are strikingly similar to those in the instant case in many particulars and the law as announced in the opinion of Chief Judge Denman is here peculiarly apposite. In the course of the opinion in sustaining the right of a group of employers temporarily to lock out their employes, it is among other things said:

" 'The pertinent facts are that the single union of all the employes of the eleven dealers was engaged in active negotiations with all the dealers as a unit for an amendment of an existing agreement between them as to wages and conditions of employment. While the negotiations were pending, the union, by a vote of the employes of all the firms of the dealers' unit, had called a strike, which followed, of the employes of one of the members of the dealers, the Union Furniture Co. The latter company at the time the strike was called was complying with all the provisions of the then existing agreement.

" 'The union leader in charge of the strike called it on the particular dealer as the beginning of an announced 'whip-sawing process' against one after another of the remaining ten, which well could result in strikes against all the dealers.

" 'The effect of such a recurrent whip-sawing process is obvious. No one of the ten remaining dealers could know whether or not its store was next to have its employes sawed off in the continued whipping. Hence none could feel it safe to take orders from its customers on which they would be embarrased by non-deliveries to them. Likewise, no dealer was safe in placing orders for furniture with the manufacturers, which well



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might find no employe to unload it in their stores, or if so delivered to the stores it would lie as depreciating overstocked inventories.

" 'To meet this powerful and effective economic coercion by all their employes, the ten remaining dealers temporarily locked them out though retaining them on their payrolls—but as not working and earning pay—and treating them as employes with protection as to seniority and other benefits when the dispute was settled.'

Not Abandonment of Group Action

"But it is argued that respondents gave up multi-employer bargaining in favor of single employer bargaining. This transformation is said to have resulted from the letters passing between representatives of the union and respondents above set out. In the final analysis, therefore, the question now before us is a very narrow one. Did the preliminary negotiations reflected in the aforementioned letters so change the relation of the parties that the respondents had no common and joint economic interest to protect?

"It is to be noted that there was nothing more than preliminary negotiations none of which resulted in a course of action. The letter from the union was in the nature of a preliminary invitation to bargain individually with respondents while the letter of respondents was at most an assent to an effort to settle the differences between the groups by such proposed negotiations. However, the union at once repudiated its own proposal to bargain individually by calling a strike at two of the industries, and no action by either party was ever taken pursuant to these preliminary negotiations. The respondents, to prevent a whipsawing process, as that term is defined in Leonard v. National Labor Relations Board, supra, temporarily locked out their employes and thereafter bargaining was resumed between the representatives of the respondents as a group and the union, and not between individual respondents and the union. The union in calling these strikes in effect repudiated its own proposal to bargain individually and the respondents were certainly relieved from any efforts to assist and promote bargaining with individual respondents.

"The author of the article on Contracts as published in Volume 12, American Jurisprudence, page 526, in distinguishing preliminary negotiations from offers, among other things says:

" 'If a proposal is one merely to open negotiations which may or may not ultimately result in a contract, it is not binding though accepted. An invitation to enter into negotiations

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is not an offer which, together with the acceptance thereof, forms a contract. Such a proposal may be merely a suggestion to induce offers by others. Care should be taken not to construe as offers, letters which are intended merely as preliminary negotiations.'

Court's Decision

"To hold in the instant case that these preliminary negotiations resulted in a binding agreement to abandon multi-employer bargaining in favor of single employer bargaining would put a premium on sharp practice. As a matter of law, in the circumstances disclosed by this record, we hold that there was no abandonment by the respondents of their right as a group to resort to a temporary economic lockout of their employes. Enforcement of the order will therefore be denied."

Commercial Fertilizers*

Reviewed by Dr. Wm. A. Albrecht†

This volume of 600 pages is a revision and extension of the book which has already had recognition as a helpful guide in thinking about the source and use of commercial fertilizers. Coming, as it does, from an agronomically minded author, and out of the South where fertilizer has long been a requisite for crop production, it represents a good combination of the sciences and the practices concerned. There is also the author's maturity, when this is the fifth edition, to give confidence to the reader in the helpfulness in reading this text.

When Dr. Collings dedicated the volume to names like Lipman, Hopkins and Davidson, under whose thinking he was tutored, the reader will also feel assured that the facts in the text represent mature knowledge in a well-considered, and careful arrangement rather than in a hastily assembled, reporter-like collection.

The text carries illustrations at the rate of about one every three, or less, pages to reach the mind via the eye. Then with tabular material interjected almost equally as plentifully, the reading of the book will not be a tiresome following of printed words only.

Every chapter in the fourth edition has been extended and modified to bring it abreast of present-day thinking and experience in the use of commercial fertilizers for better crop production. Since this revision follows by only about a half dozen years after the fourth edition, this is evidence that progress in the subject has been crowding along improvements in fer-

*Author Gilbert H. Collings, McGraw-Hill Book Co., New York, N. Y., (Fifth edition, 1955), $8.00.

†Chairman, Dept. of Soils, College of Agriculture, University of Missouri.

THIS JOY CHALLENGER REPLACED FOUR WAGON DRILLS

QUARRY INCREASES PRODUCTION 600 YDS. A DAY IN SWITCH TO JOY TM-500 CHALLENGER DRILL

OVER EIGHT YARDS OF ROCK PER FOOT OF HOLE

. . . That's the production rate of the Joy Challenger on this quarry job. 3⅛" holes, in a 17' x 13' pattern, were drilled to depths of 30'.

ONLY ONE-AND-A-THIRD YARDS FOR THE WAGON DRILLS

The footage per day with the Challenger averaged 275 ft. The wagon drills . . . with smaller, shallower, less productive holes in a closer pattern . . . averaged only slightly more—300 ft.

CHALLENGER GETS OVER 2200 YARDS A DAY

Compare that with the four wagon drills which were able to produce a bare 1600 yards a day . . . less than 75% of the Challenger's output.

SELF-PROPELLED CHALLENGER SETS UP FAST

The 5¼" TM-500 Challenger Hammer Drill features powerful blowing action and rotation. Hydraulic control of mast and leveling jacks gives fast, easy setups.

BULLETIN 87-U GIVES COMPLETE DETAILS

Write for your free copy, today, to *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.* In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

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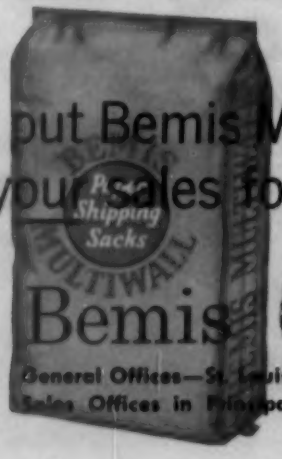
"Exploit the fact that we use Bemis Multiwall Bags 100% and capitalize on the established excellent reputation of the Bemis Bro. Bag Company for quality workmanship and materials."

We are naturally pleased by this testimonial to the quality which we constantly work to put into your bags.

Even more, we are glad to have such confirmation of a point we have often stressed:

Good, well printed bags are a real sales help!



Why not put Bemis Multiwalls on your sales force?

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tilizer production. Also, the interest and experience in fertilizer practices has multiplied the readers to exhaust the previous edition. This fifth one is timely when the flood of research by agronomists and of experience by farmers with soil fertility treatments is connecting soil fertility more closely with plant nutrition.

A new chapter on liquid fertilizers has been added. This aspect itself indicates the close attention with which Dr. Collings has been following the developments in the field about which he offers knowledge in this publication. When crop production can no longer go forward under a blind faith in the pedigree of the seed or under the good graces of the weather; and when we must feed the crops regularly on many soils of mere feed-lot service. Dr. Collings text will become a more widely used hand book by both the agronomist and the farmer.

As another testimony of the forward-looking thought of this book, the author is not emphasizing crop yields as quantity alone but also as quality in terms of nutrition. "As there is an unbroken linkage," he says, "between mineral-deficient soils, deficient crops, and malnutrition of people, we find many educated city people beginning to concern themselves with the nutritive quality as well as the quantity and price of their food supplies. Physicians are slowly coming to realize that with humans much that we now call 'disease' might be more correctly labelled 'nutritional deficiency'." When we must fertilize the soil to feed more of ourselves, then fertilizer texts like this one will be widely read by the consumer as well as the grower of our garden and field crops.

With 550 pages of text, 40 pages of references supporting the author, and the ample additional undergirding in illustrations and tables, the many questions about what fertilizers are, of what they are made, and how they are properly used will be answered in good readable style. The make-up of this volume is quality for long time service.

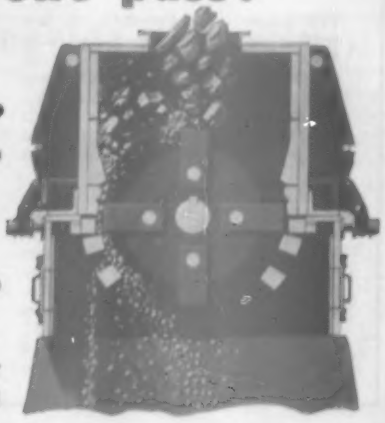
Asbestos-Cement Products

THE AMERICAN SOCIETY FOR TESTING MATERIALS has announced that Committee C-17 on Asbestos-Cement Products plans to develop a specification for asbestos-cement sewer pipe as a companion to the present specification for asbestos-cement pressure pipe, C 296 T. A method for determining the degree of "cure" is being considered, and continued studies are being made on procedures for measuring handleability and organic content of asbestos-cement products.

IMPACT!

this crusher sizes limestone and cement rock for fine grinding... in one pass!

rugged... reversible... four sizes up to 400 t. p. h.



CROSS SECTION OF JEFFREY IMPACT TYPE REVERSIBLE CRUSHER

Typical Screen Analysis—One Pass Through of Average Limestone							
Mesh Screen	1½"	1"	¾"	½"	⅜"	¼"	⅛"
Average ¾" Product—% passing	98	94	90	77	67	54	45
Average ½" Product—% passing	ALL	ALL	98	95	90	80	68

WRITE FOR BULLETIN 868

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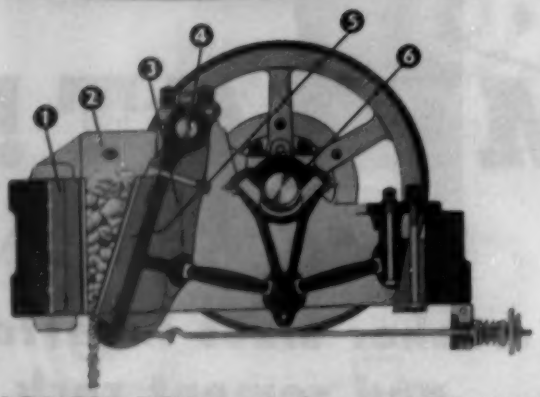
IF IT'S MINED, PROCESSED OR MOVED ...IT'S A JOB FOR JEFFREY!

FARREL-BACON JAW CRUSHERS



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The frame of a Farrel-Bacon jaw crusher is cast in one piece from Meehanite® metal to take the shock of prolonged and severe crushing service. At points of wear this frame is protected by parts which absorb any wear that might occur, and can be easily replaced at minimum cost.

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Many of the working parts are preserved similarly. The swing jaw has a replaceable wearing plate (5), and the main bearings (6) can be easily removed and rebabbitted in the shop.

Farrel-Bacon can help you lay out your plant as well as supply all necessary equipment from primary crusher to bin gate. Write for further details.

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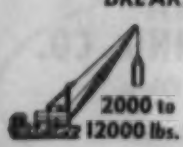
MORE PROFITABLE, EFFICIENT SECONDARY BREAKAGE. WE CAN SHIP IMMEDIATELY.



The "Cape Ann" Forged Steel Drop Ball is standard equipment in up-to-date quarries. It has a forged connecting link, protected by deep recess, adaptable for swivel or shackle. Strong alloy steel pin. Low cable replacements. Furnished complete as shown.

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Measuring High Temperature

(Continued from page 128)

mosphere, and a leaky instrument housing allowing dust to get inside are common causes of trouble. To overdamp a galvanometer by tightening screws or in other ways preventing vibration of the pointer makes the instrument less responsive, and may falsify measurement. The wider use of rubber-to-metal bonded mountings is the best way, apart from re-location of the instrument case, to deal with vibration troubles.

Dry cells used for producing a constant potential must be kept clean and dry. Potentiometer controllers use a mechaincal section for producing control movement, and this mechanism positions mercury switches or makes and breaks contacts, which all require proper care.

Many troubles can be avoided in practice if pyrometers are correctly installed. The great variety of instrument types, of thermocouple heads, of length of stem, of different sheath materials for protection of the hot junction, make each installation an individual job. Certain general rules, however, are easy to observe, and some have already been mentioned.

Getting Permeable Concrete Watertight

By F. O. ANDEREGG

WOLFGANG REPORTS A STUDY of this problem in *Benten-Zement Mart* No. 516 (1955).

Some concrete walls fail to be watertight, whether through poor grading of the aggregate or poor compaction or through shrinkage cracking. To make these watertight, bituminous membranes may be used. Sometimes paper coated with vinyl chloride (DUBAN) are cemented on the wall. This requires protection against mechanical damage by stuccoing or even building a special wall. Polyvinyl acetate emulsions may be applied in three or four coats, especially over a smooth surface, and require no added protection according to Dr. Grün.

Metal coatings may be sprayed on with a special acetylene flame. Lead is suitable to use where sulfate, aggressive waters are to be encountered.

Stuccos made using cements resistant to aggressive waters can give good results, especially when certain deflocculating agents are added.

I-DEAL CONCRETE COMPANY and Pre-Mix Concrete, Inc. have consolidated operations at Roseburg, Ore. Frank H. Rogers, owner of I-Deal, purchased six ready-mixed concrete trucks, and leased the batching plant from Buckley Bell, owner of Pre-Mix.

Compare...you'll buy the Austin-Western 201 high-output portable crushing and screening plant

It will pay you to compare carefully specific design and construction features before you buy any crushing and screening plant. Study the chart in this ad to see why the Austin-Western 201 is your best bet for high output at low cost. It will win "hands down" as the finest crushing and screening plant in its class. You'll prove that conclusively when you compare A-W with all other makes.

For detailed information about any of these points or copies of our latest catalogs, please write: Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio; or your nearby Austin-Western Distributor.

Why it will pay you to COMPARE before you buy:

COMPARE	A-W	MAKE "X"	MAKE "Y"	MAKE "Z"
1. Steel plate frame for high strength without weight of cast steel frame.	YES	NO	YES	NO
2. Machined steel toggle plate for absolute protection instead of cast iron.	YES	NO	NO	NO
3. Inclined positive-throw type vibrating screen.	YES	YES	NO	YES
4. All moving screen parts operate in rubber bushings that need no lubrication.	YES	NO	NO	NO
5. Dual rear wheels for added stability. Fully enclosed brakes on rear tandem.	YES	NO	NO	NO
6. Over-size self-aligning spherical bearings in crusher.	YES	YES	YES	YES
7. Heat treated chrome vanadium steel shaft in crusher.	YES	NO	NO	NO
TOTAL	100%	28½%	28½%	28½%

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CRUSHING, SCREENING & WASHING EQUIPMENT

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Construction Equipment Division LIMA, OHIO, U.S.A.

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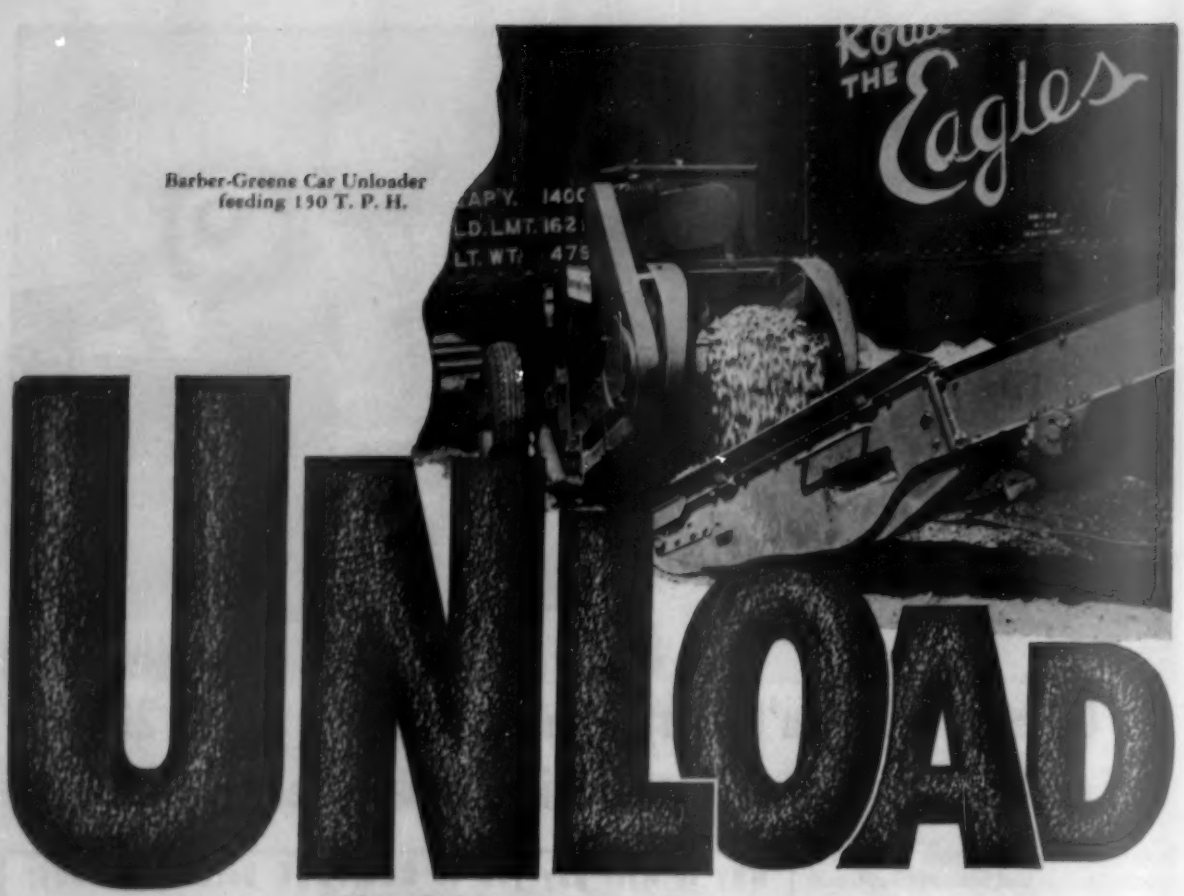

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UNLOAD practically automatically.

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cost studies . . . nearby job inspection . . . plant layouts

BETTER BUILDING MATERIALS

By THERON C. TAYLER*

A DETROIT NEWSPAPER recently carried an item destined to cause a rash of bad masonry. Disintegrating masonry is very prevalent. In buildings more than 20 years old there are more defective than perfect walls. This is particularly noticeable in residential districts, where porches and pillars are patched or in need of repairs, chimneys need repointing and basement walls are cracked, leak and effloresce.

Engineers, architects, builders and others interested in the manufacture, sale or use of brick, block, lime, cement or any other masonry material may easily determine the several causes for this huge and unnecessary economic waste. For many, perhaps most, the results of some simple investigations will be a great surprise and a shock to their complacencies.

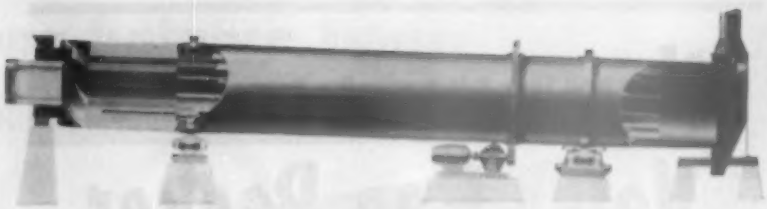
Research reports available have not been very widely publicized, probably because even publishers can be skeptical. The reasons for skepticism lie too deep for any mere repetition of such reports to be effective.

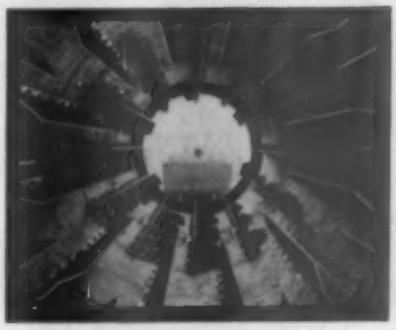
Everyone involved in any way with masonry construction owes it to himself and to his client to give just a little more than superficial thought to this subject. Masonry disintegration involves all kinds of materials. Sometimes the masonry units are affected; more often the bonding materials seem to be the source of trouble. We will skip discussion of some obvious constructional causes to concentrate on the controversial factors, those which involve functions of the unit and of the mortar.

First let us investigate the case of unit failure. Our starting point is an old brick wall about to be torn down. Remove from that wall a few of the disintegrating brick and, in each case, an immediately adjacent perfect brick. Dry these to constant weight; then saturate to constant weight. If you have been very careful with measurements you will probably be surprised to find that the bad bricks were those of low absorption. Yes, there is an explanation for a confusing disclosure.

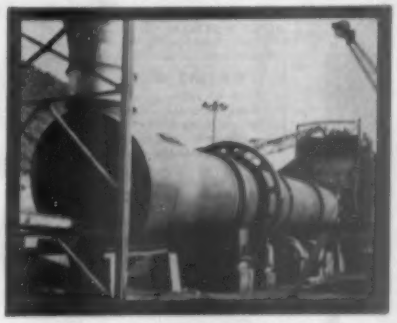
Second, improper mortar mixtures are the more common source of masonry difficulties. Building codes have made us overly conscious of strength at the expense of durability. Walls break; a diagonal crack is obviously due to settlement of a part of the footing; vertical cracks at intervals of 20 to 50 ft. are just as obviously due to wall shrinkage. All such cracks

*Taylor Engineering Service, Detroit, Mich.





Interior of shell of "XH" Ruggles-Coles Dryer showing lifting flights and "knock-out" chains.



10' diameter, 80' long "XH" Ruggles-Coles Dryer drying bauxite.

from Alumina ores to Zircon concentrates

... in the drying of ores and concentrates. That is the story of Ruggles-Coles "XH" Dryers.

Small or large, each dryer is designed for the specific requirements of the user with the knowledge and experience gained from hundreds of installations.

Complete specifications upon request. Ruggles-Coles Dryers are described in Bulletin AH-438-7.

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Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of from 1/4" to 1 1/2" thickness. Write for Catalog Sheet.

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New AUGER-MATIC Valve Bag Packer

SHAKES . . . SETTLES . . . AS IT WEIGHS AND FILLS

CUTS YOUR BAG SIZE AND COST

AUGER-MATIC fills, shakes and weighs paper valve bags all in one operation. Just push the starter button and when desired weight is reached it shuts off automatically. Cuts cost of bags and packing costs on powdered, granular, pellet and fibrous materials . . . reduces dust to a minimum.

SECURITY BAG CLAMP
POSITIVE-CONSTANT FEED
Feeder-matic unit (optional) with built-in positive feeding auger to insure the flow of fluffy, fibrous or sticky materials which are inclined to clog or bridge in the hopper.
PUSH BUTTON CONTROL
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Built-in scale provides constant, accurate weight of materials being packed automatically . . . eliminates need for pre-weighing or additional handling. Also has a "Fine Weight" adjustment wheel for final adjustment of net and gross weights . . . and shuts off machine when preset weight is reached.
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Jolts each bag vigorously and repeatedly during the filling process. This prevents any slack-filled bags . . . permits the use of minimum size valve bags at correspondingly lower cost for bags.
ALL IN ONE OPERATION
WEIGHT & SPACE SAVING BAGS
ANOTHER Coddington PRODUCT

NEW!

Fill Valve Bags as Small as 10 Pounds

Your Present Auger-MATIC is now more versatile than ever

New small sizes spouts and augers now available to fit production requirements on 10 to 25 pound bags. You can change in a matter of minutes from packing 100 pound bags to the 10 pound valve bags . . . cut cost by using minimum size bags for exact weight desired.

For further information... call or write

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are unnecessary. Look up the record of mortar mixture used for all walls with which you are familiar which have vertical cracks and compare with the mixtures used for walls which are free from such shrinkage cracks. You will find the cracks to be the result of too high a cement content. But do not take my word for it, make your own investigation.

The most common form of masonry failure is characterized by the crumbling and disappearance of the mortar, frequently accompanied by seasonal efflorescence on either or both sides of the wall. One may blame the weather, but why then is the mortar in such good condition in so many ancient structures? Why do builders of tall chimneys use a mix consisting of two parts of lime, one of cement and five of sand, all by volume? What were the mixtures used in the good and bad walls with which you are familiar? If a mortar cement, what was its composition?

It is often said that "the proof of the pudding is in the eating." So it is with mortars. If we will check the mixtures used for walls which are disintegrating with the mixtures which successfully resisted weathering for 20 or more years, keeping in mind the specific differences in needs for parapets, piers, chimneys, sewers, veneer, basement walls with and without waterproof coatings and the widely different effects of units of high and low absorption, we will find that there are specific needs and places for all proportions of binder from 100 percent cement to 100 percent lime and a wide variety of mortar cements and that one part by volume of a binder may require anywhere from 1½ to 3½ parts of sand. To use the same mixture for all conditions is to ask for trouble. To theorize, without research experience, can be just as bad.

Basement walls that leak badly are usually the result of an extra-ordinary attempt to assure non-leakage. There is no better way to assure a leaky basement wall than to do as so many do; i.e., combine a high cement content mortar with a good external waterproof coating. By so doing one makes certain that the wall will shrink as it dries and the resultant cracks will open the way for water to enter through the external coating. Again I ask, do not take my word for it. I am merely trying to stir up a general interest in simple, inexpensive research—just a matter of observation—a checking of results against records of materials used.

•

SAND LAKE GRAVEL CO., Duluth, Minn., has been incorporated by Dudley Jacobson, Alf Mobroten and Henry B. Schmidt.

✓ happy balance between dependable performance and moderate cost

ROLLWAY STEEL CAGE ROLLER BEARINGS

Tru-Rol *precision, steel-cage, heavy-duty bearing with contoured guide lips assuring true right-line rolling, maintained roller alignment and thin oil film.*

● Rollway's *TRU-ROL* Steel-Cage Bearings afford wide latitude in balancing *dependable* performance, *long* life, and *high load* capacity against *moderate* cost. They rate high in any comparison on a cost-performance basis.

A choice of stamped steel retainers with contoured guide lips, or steel segmented retainers assure true rolling and an evenly distributed *thin* oil film — *big factors in reducing power losses and heating.*

"Crowned" Rollers Relieve End Stress

TRU-ROL offers the extra advantage of a finish-ground "crown" radius on the roller ends. That relieves high end-stress and insures uniform load distribution over the entire length of the roller. The result: *TRU-ROL* Steel Cage Bearings carry heavier loads over longer periods without excessive end-fatigue. They are less affected by slight misalignment or shaft deflection.

Investigate *TRU-ROL* Steel Cage Roller Bearings before selecting any bearing in the medium price range.

TYPE D

Rollway Metric Series Steel Cage Roller Bearings

● Rollway Metric Series Steel-Cage Bearings offer the greater load capacity of solid cylindrical rollers, plus the true right-line rolling of trunnion rollers turning in a rigid steel cage. There's no roller skew, no pinch out, no cam action. Design permits maximum bearing capacity . . . within small space . . . at moderate cost.

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4. SPANG BITS are furnished with *semi-dressed drilling ends* which permits a bit to be dressed out to gage in less time and with fewer heatings.

5. SPANG BITS are *available in high carbon* and two grades of *alloy steel* to enable the user to select the quality of steel most suitable for his drilling conditions.

These five features, plus others, are reasons why for over half a century, SPANG Heat-Treated Drilling Bits have consistently produced more footage at lower cost.

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For over 60 years Manufacturers of Spang Weldless Jars and a Complete Line of Cable System Drilling and Fishing Tools for Oil and Gas Wells, Water Wells, Prospect Drilling and Shot Blast Holes.

Many Bonus Values Cut Cost of Difficult Fine Mesh Screening

By combining many extra values, the Leahy® No. Blind® Vibrating Screen cuts the cost of screening damp, sticky materials such as lime, ag-lime and silica sand.

Only the Leahy offers both mesh clearing differential vibration and FlexElex heating of the jacket. The Leahy vibrates the jacket only. Improved electrical circuits reduce heating power consumption.

For full information ask for BULLETIN 15-J.

THE DEISTER CONCENTRATOR COMPANY

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Perlite Officer Resigns

RICHARD L. DAVIS has resigned as secretary-treasurer of the Perlite Institute, New York, N. Y., to accept a position as executive secretary of a New York state association which has no connection with the building construction field. Richard S. Funk, promotion director, and Richard J. O'Heir, technical director, have been assigned equal management of the Institute. Mr. Funk, as administrative secretary, will handle all promotion, public relations and duties of the secretary-treasurer not of a technical nature. Mr. O'Heir, who becomes technical secretary, will administer all technical and research activities of the Institute. He will also supervise operation of the perlite industry's Certification Program.

Technical Service Manager

ROBERT G. WATSON has been appointed technical service manager of the Universal Atlas Cement Co., New York, N. Y. He has been technical service engineer since 1947, and succeeds G. E. Elsenhaus, who has resigned. A native of Spartanburg, S. C., Mr. Watson graduated from Clemson Agricultural College, Clemson, S. C., with a B.S. degree in civil engineering. Following three years' service with the U. S. Navy in World War II, he joined Universal Atlas in 1946 as a trainee in the technical service bureau, Chicago, Ill., and one year later was advanced to technical service engineer. Mr. Watson is a member of the American Concrete Institute.

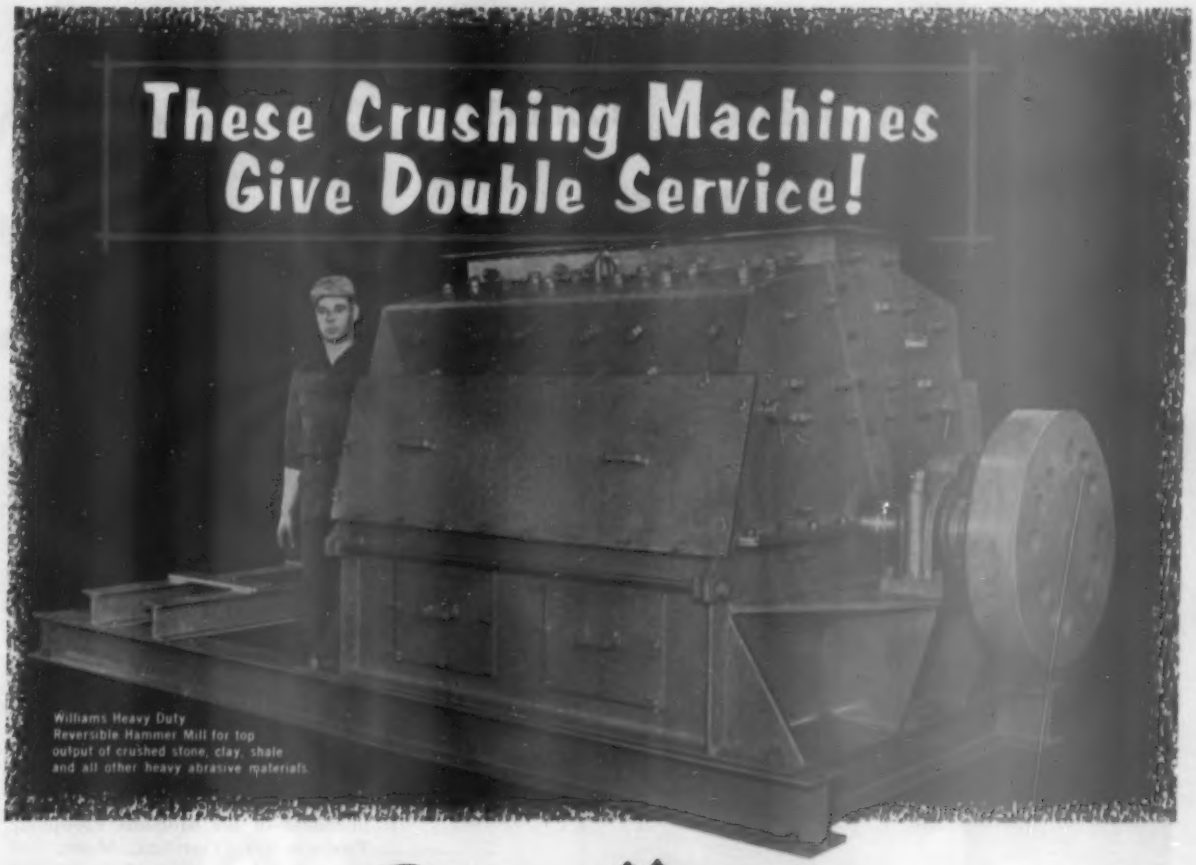
P.C.A. District Manager

THOMAS D. SHIELS has been appointed district engineer of the Austin, Texas, office of the Portland Cement Association, Chicago, Ill. He succeeds James D. Piper, who was recently promoted to vice-president for promotion. A civil engineering graduate of Virginia Military Institute, Lexington, Va., Mr. Shiels has been associated with the P.C.A. for more than 25 years, joining the Dallas district office in 1925 as a field engineer. After service in World War II, he rejoined the Portland Cement Association as a field engineer in the Dallas office, and later served in the same capacity in the Austin district office.

Waterways Board Chairman

VINCENT A. KOGGE, manager of the water transportation division of Marquette Cement Manufacturing Co., Chicago, Ill., has been elected chairman of the board of the American Waterways Operations, Inc., Washington, D. C. Chester C. Thompson was re-elected president, and John H. Eisenhart, Jr., secretary-treasurer.

These Crushing Machines Give Double Service!



Williams Heavy Duty Reversible Hammer Mill for top output of crushed stone, clay, shale and all other heavy abrasive materials.

WILLIAMS *Reversible* HAMMER MILLS

Double service from hammers, breaker plates and grate bars—maintenance reduced to half or less—downtime cut as much as 50%—these are only a few of the money-making, time-saving features of Williams Reversible Hammer Mills.

Operation either clockwise or counter-clockwise with a reversible motor promises that hammers and other internal parts will work twice as long without even opening the machine. Slower and more even wear results in continuous peak output of a uniformly high quality product while, at the same time, demanding the very minimum of time and expense in the replacement of worn parts.

Reversible manganese breaker plates also give twice the usual length of service, and are adjustable to compensate for hammer wear to maintain original close settings.

For the most in real operating economy, high production and top quality products, get the facts about Williams Reversible Hammer Mills. *Write For Catalog.*

Open view of Reversible Hammer Mill. Note heavy shock-proof, wear-resistant manganese steel liners and breaker plates, and the rugged, reinforced construction. Entire interior easily, quickly accessible. Rotor removable without disturbing feeder or feed chute.

WILLIAMS PATENT CRUSHER & PULVERIZER CO.
800 St. Louis Ave. St. Louis 6, Mo.

WILLIAMS

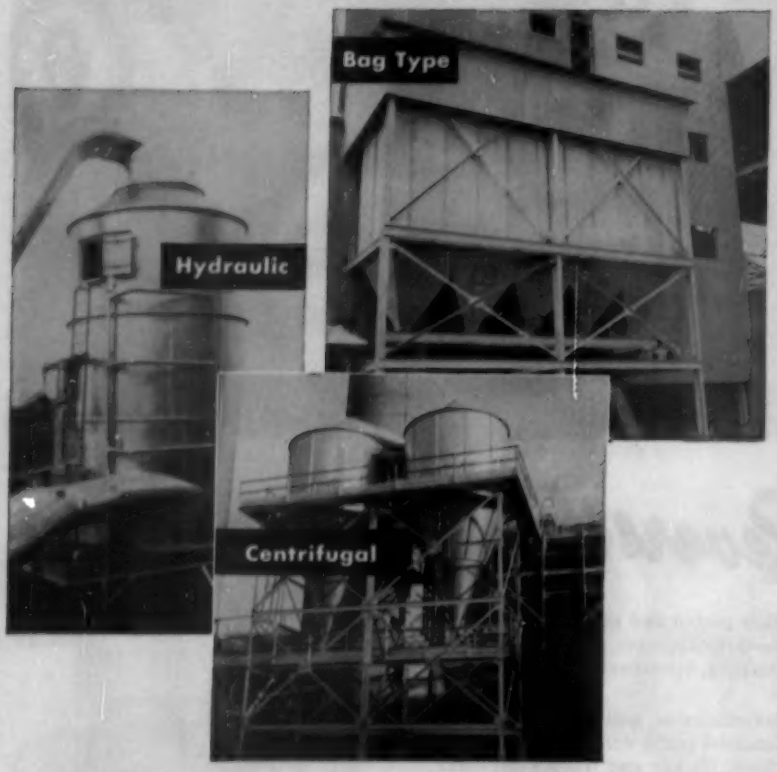
CRUSHERS GRINDERS SHREDDERS

Impactors Helix-Seal Mills Roller Mills Air Separators Vibrating Screens Feeders

OLDEST AND LARGEST MANUFACTURER OF HAMMER MILLS IN THE WORLD

Use this valuable aid to safety, health, operating economy

...Norblo engineered Dust and Fume Collection



Any dust condition can increase operating and maintenance costs, slow down employee performance and increase industrial accidents. Norblo helps you to achieve outstanding efficiency in dust and fume collection—helps you to avoid those costly factors *economically*.

Norblo's experience in the removal of injurious or "nuisance" industrial air contaminants as well as *salvaging* valuable materials has been extensive in most industries. Complete systems are engineered to specific situations, incorporating one or more of the three collection systems represented above, according to your need. Get the facts on Norblo *guaranteed* performance. Write us about your problem.

The Northern Blower Company

Engineered Dust Collection Systems for All Industries

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Senior Geologist

DR. PHILLIP L. MERRITT, formerly assistant director of the raw materials division of the Atomic Energy Commission, has been appointed senior geologist in the New York offices of E. J. Longyear Co., mining engineers of Minneapolis, Minn. A graduate of the University of Minnesota, Dr. Merritt obtained his doctor's degree at Columbia University. He is a member of the Geological Society of America, American Institute of Mining and Metallurgical Engineers, Society of Economic Geologists and the Mineralogical Society of America.

Chief Engineer

DONALD K. ARCHER has been named chief engineer of the Niles plant of National Gypsum Co., Buffalo, N. Y., and will have charge of all engineering activities in the expansion program at this plant. He was formerly chief mechanical engineer for the International Minerals and Chemical Corp., Chicago, Ill. Mr. Archer is a graduate of Illinois Institute of Technology, Chicago, Ill., and attended Northwestern University graduate school of business, Evanston, Ill.

Mining Association President

FRED E. BURNET, operating superintendent of the Montana Phosphate Products Co., Garrison, Mont., has been elected president of the Mining Association of Montana. Mr. Burnet is a graduate of the University of British Columbia, where he received his B.S. degree in mining engineering. Charles S. Burriss, manager of the Trident, Mont., plant of Ideal Cement Co., Denver, Colo., was elected first vice-president.

Sales Director

LOUIS F. WEYAND, executive vice-president and a director of the Minnesota Mining and Manufacturing Co., St. Paul, Minn., has been named sales director. He succeeds George H. Halpin, also an executive vice-president and board member, who has retired after 25 years of service but remains as a consultant in specific sales and operating problems. Mr. Weyand has completed 40 years of service with the company.

Superintendent Retires

WILLIAM F. HOUSER, general superintendent of the Penn-Allen, Penn., plant of Penn-Dixie Cement Corp., New York, N. Y., has retired after 50 years of service. William P. Gano has retired as chemical engineer after 52 continuous years of service, and Harry L. Worman has retired as assistant treasurer after 53 years of service.

I'M SOLD ON Kleenslot WEDGE WIRE SCREEN GUARDS

They're Rugged, Dependable, and give Long Life Performance

The screen guard is built into the screen and the guard bars permit only the finer particles to pass over the screen. This item can be furnished in special sizes to your requirements in practically any type of long wearing metal.

Complete literature is available. These screen guards are non-clogging, non-blinding, and are strong, rigid, uniform and extremely economical.

Wedge-Wire CORPORATION
GAS STREET AT NICKLE PLATE R. R., WELLINGTON, OHIO

CHILL HARDENED ROLLERS

For grinding, crushing, pulverizing and many other operations... it pays to specify **acf** Chill Hardened Rollers. Cast from standard wheel mixture, they boast an unusually high degree of metallurgical uniformity and greater strength. **acf** Rollers are also quick chilled to provide an extremely abrasive-resistant surface that will withstand tremendous pressures and irregular contacts. Result: EXTRA WEARABILITY... INCREASED ROLLER EFFICIENCY... FEWER WORK STOPPAGES AND REPLACEMENTS!

Now Ni-Hard* Rollers are also available! Ask your **acf** Representative for information on *both* types of roller. Available in all sizes.

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acf INDUSTRIES, INCORPORATED
New York • Chicago • St. Louis • Cleveland • Philadelphia • Washington • Berwick, Pa. • San Francisco • Huntington, W. Va.

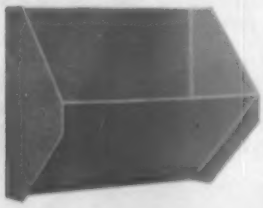
THOUSANDS
OF HOURS OF DEPENDABLE OPERATION AT LOWER COST

- SELF CLEANING
- STRONG REINFORCED WELDED CONSTRUCTION
- LOW COST

STANDARD WING TYPE SELF-CLEANING PULLEY

So strong it can withstand the most punishing loads without flinching because its all-steel welded construction gives it far greater strength with less weight at lower cost.

CONTINOUS ELEVATOR BUCKET STYLE No. 2



Built to take the hardest use you can give it and come back for more, this bucket is typical of the complete line of low cost, rugged Standard Steel Buckets — available in Salem, Style "A," shelf type and other continuous style buckets.

STANDARD BIN GATE

Speed material handling with this Standard gear-operated bin gate, which has all-steel welded construction. Other styles in Standard Bin Gates also available.

Slash material handling costs by converting to Standard. Write today for catalog showing the complete Standard line.

STANDARD METAL MFG. CO.
110 CENTER ST. MALINTA, OHIO

Kansas Minerals Conference

APPROXIMATELY 75 crushed stone and cement producers, hot mix contractors and highway engineers as well as oil and asphalt producers and others attended the recent "Conference on Rock Products" held at the University of Kansas. The meeting was co-sponsored by the Kansas State Geological Survey, Department of Mining and Metallurgical Engineering, and University Extension in cooperation with the Kansas Limestone Producers Association.

Chief topic of the two day discussion was Kansas limestone, its qualities, characteristics and uses. It was pointed out by two or three of the speakers that Kansas limestone varied appreciably from quarry to quarry over the state. These qualitative variations impose upon county and state highway engineers some limitations in the determination of specifications for crushed rock to be used in roadbeds, hot mix and concrete used in highway construction. Merritt Royer of the Asphalt Institute pointed out that specifications set by the Kansas Highway Commission are in keeping with those of other states and that to change such items as absorption requirements would not benefit greatly the production costs of Kansas limestone. As a case in point, Mr. Royer said that when Kansas specifications were changed to allow use of sand the price of stone was not lowered a great deal.

Russell T. Runnels, chief geochemist of the Geological Survey, reviewed the growth of limestone quarrying in Kansas and pointed out future possibilities for the industry. One or two cement companies still produce natural cement in Kansas — a high quality cement whose durability is evident in some of the early built structures still being used.

Mr. Runnels pointed out that the post-war market for limestone and other stone products needs to be maintained by careful planning and production based on knowledge of various deposits gained through research and exploration. Since 1949, the Geological Survey has made more than 300 complete chemical and spectrochemical analyses of limestone samples from formations at the top of the Mississippian rocks in the southeastern corner of the state, through the Pennsylvanian in eastern Kansas and into the Permian at the western edge of the eastern one-third of the state. He mentioned 26 eastern counties where there are deposits of high-purity limestones having 95 percent or more of calcium carbonate.

The "dual-purpose" qualities of Kansas limestone were explained by John Schleicher, chemist-spectographer for the State Geological Survey of Kansas following Runnels' discussion. Among the detailed, factual data was the information that trace elements (those appearing in quantities of less than 0.1 percent) in Kansas limestones won't affect the industrial uses and at the same time are useful as soil fertilizer.

Kansas has some high quality stone in many quarries, Professor C. H. Sholer of Kansas State College pointed out, but modern machinery and quarrying methods are geared to speedy, quantity production so that thin layers of good stone are left behind in favor of more accessible veins. During the depression when maximum use of man hours was the by-word these hard-to-get thin layers of better rock were more likely to be quarried along with the rest. Professor Sholer cited the road from Junction City to Abilene, among others, as an example of construction in which better quality stone produced locally, several years ago has held up under heavy traffic. Some stone quarried over the state is good for

(Continued on page 163)

Link-Belt line includes welded steel and gray iron pulleys as well as welded steel slat pulleys.

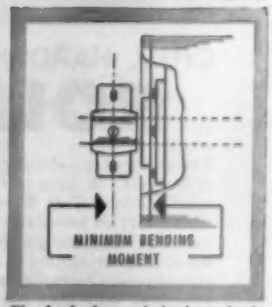
Takes the work out of field mounting

LINK-BELT assembles pulley on shaft—insures correct keyseat alignment

YES, you get a two-way dividend because Link-Belt mounts belt conveyor pulleys on their shafts at the factory. What's more, the flush-hub construction means better operation.

Made with either crowned or straight face, they are available with vulcanized lagging, either plain or herringbone. Your choice of bolted or taper lock hubs.

You can get complete information on belt conveyor pulleys from your Link-Belt salesman. Call him today.



Flush hubs minimize shaft deflection, cut hub bolt stress and disc deflection.

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WELDED STEEL CONVEYOR PULLEYS

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LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

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Flash DRYING

SINCE 1887

RAYMOND ROLLER MILL with Flash Drying Accessories and new type Package Furnace

RAYMOND MILLS with Flash Drying System solve many production problems in the non-metallics field at a definite saving in cost. Separate dryers are eliminated—material handling is simplified—drying and grinding operations are combined in a single unit of equipment—and the whole process is clean, dustless and automatic.

In pulverizing limestone, the Mill can take the raw feed containing 5% to 8% surface moisture and reduce the material to a fine, dry powder with less than ¼ of one per cent final moisture content.

Many installations of Raymond Roller Mills are used for grinding gypsum ahead of the calcining kettles for making plaster and wallboard. When Flash Drying Accessories are employed, the Mills deliver the gypsum to the kettles warm, without surface moisture, and free-flowing and in a finely divided state.

This modern method is adaptable to many other similar products. Write for detailed information.

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CHICAGO 22, ILLINOIS

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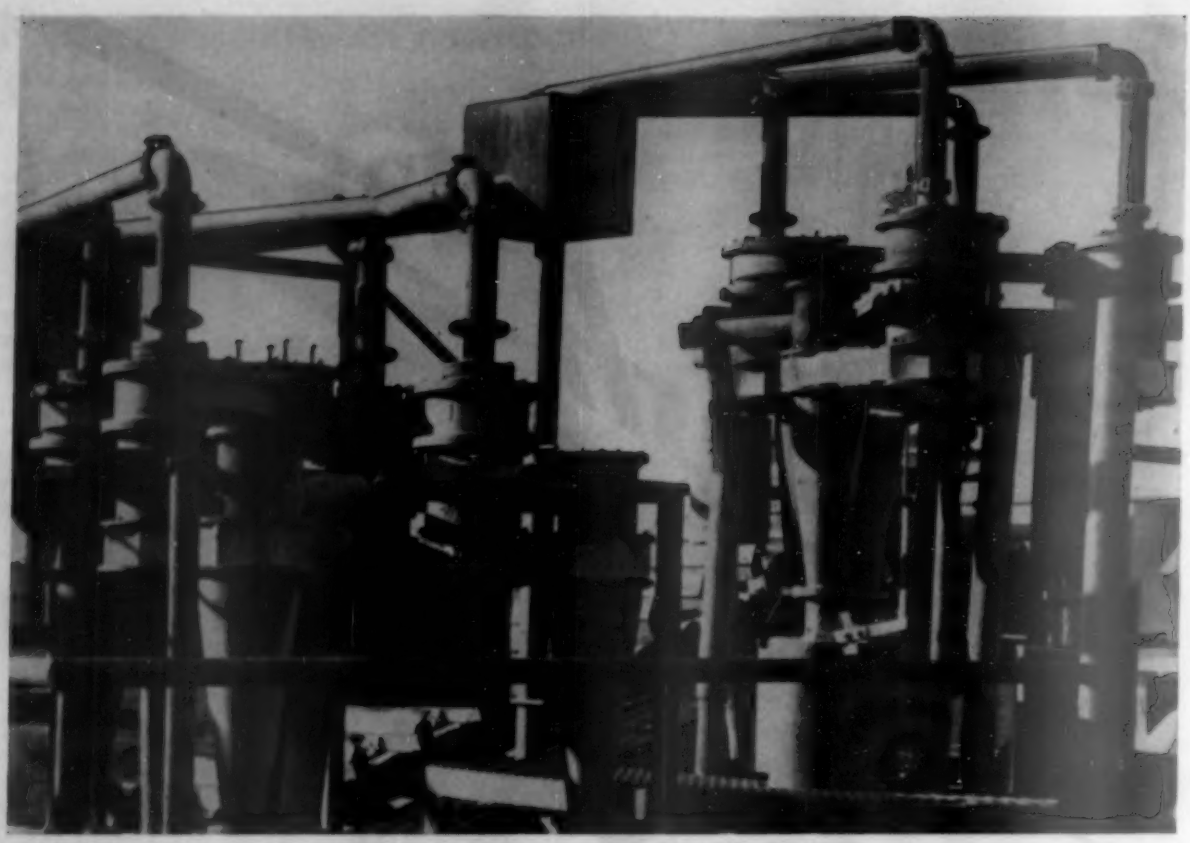

KREBS Cyclones are Recovering Profits for many Sand & Gravel Producers!

Current specifications require finer sand. Operators who are able to deliver these fines obtain higher prices for their products and have a better competitive position. Fines are becoming more necessary for concrete, asphalt, mason and industrial sands.

Here's how you can share these profits!

More than 100 Krebs cyclones are in operation recovering fine sand, many with recovery of all the plus 200 mesh sizes. If more 100 to 325 mesh sand and finer is wanted, you can get it out of your waste overflows with a Krebs cyclone.

Krebs cyclones are precision designed with moulded, replaceable pure gum rubber linings. Maintenance cost is negligible. All units permit wide change in inlet and vortex size and adjustable apex valve, giving flexibility as specifications vary.

Single and two-stage units are available in several sizes to meet conditions of flow and objectives. Write for Bulletin 121. Please advise gpm, percent solids and sizing analysis of your tailings.

SIZING OF RECOVERED SANDS

Installation	No. 1	No. 2	No. 3
% Passing			
60	96.5	96.0	83.6
80	87.6	86.3	70.4
100	73.4	74.5	51.6
200	45.8	50.1	17.2
270	19.5	11.3	2.1

Even the −270 sizes are practically all sands as true slimes follow the water rejection from the feed which is very high.

Our metallurgical staff and pilot plant facilities are available on request. Details of your classification are invited.

EQUIPMENT ENGINEERS, INC.
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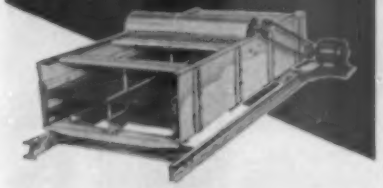
UNIVERSAL
OFFERS THE BEST
IN VIBRATING SCREENS
AT THE LOWEST PRICE



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There's a model to fit your particular requirement, priced within the smallest budget.

Write today for free catalog #150!

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VIBRATING
SCREEN CO.
Racine, Wisconsin
Quality Screens Since 1919

In plants handling Cement, Lime, Gypsum, Sand, Gravel, Crushed Stone, etc. the WEIGHTOMETER is used for fast accurate production.

WEIGHTOMETER gives a continuous, automatic, and accurate weight record of materials in transit at an extremely low operating cost. All producers of bulk materials handled by belt conveyors need this dependable check on production figures supplied by MERRICK WEIGHTOMETER.

Merrick Scale Mfg. Co.
Passaic, New Jersey

Kansas Conference

(Continued from page 160)

building but is apt to weather more than stone from other sources. Kansas limestone does have, however, a favorable quality in that when used in aggregates it tends to arrest chemical reactions which quite often occur in those aggregates. Another characteristic of Kansas limestone, which, to an excessive degree, is unfavorable in any rock used in aggregate, is its abrasive tendency. However, in spite of whatever weaknesses are present in limestone from the Jayhawk state, research and experiment are developing ways in which marginal materials may be used to good advantage.

Panel Discussion

A panel discussion on the use of limestone in hot mixes had the following participants: Max F. Oelschlaeger, engineer, Concrete Materials and Construction Co., Cedar Rapids, Iowa; Merritt Royer, district engineer, The Asphalt Institute, Kansas City, Mo.; and Claude Rhoades, Rhoades Construction Co., Newton, Kan. Merritt Royer listed the following as desirable qualities of such mixes; (1) use of an aggregate that is dry, (2) an aggregate that will take a thin coating of oil, (3) a dense mix but one that will have enough voids to take 5 percent asphalt by volume and have 4 or 5 percent unfilled voids remaining for expansion of materials, and (4) the best aggregate available for the job.

If the aggregate contains an appreciable amount of moisture, additional drying will be required, increasing the cost of the product. A soft aggregate requires care in preparation but modern machinery is geared for fast processing, which introduces rough handling. Some "dusting" therefore accompanies the crushing process and in excessive amounts will necessitate frequent disposal of dust accumulation. A further disadvantage of soft aggregate is the tendency to crushing under heavy rolling during the laying of road-beds. These characteristics result in degradation of the aggregate, which in itself is to be expected but is definitely a disadvantage when the degradation is not uniform throughout the material.

Claude Rhoades emphasized the desirability of having the quarrymen make available to engineers and designers the quality of product they can produce. This in turn would enable the engineers to make allowances in advance for the quality of product they can produce. This in turn would enable the engineers to make allow-

(Continued on page 164)

"LUBRIPLATE, THE OUNCE OF PREVENTION"

says
VULCAN IRON WORKS, INC.
of Chicago, Ill.

—a leading manufacturer of pile driving and extracting equipment

"For many years we have used LUBRIPLATE Lubricants for shop assembly, and have recommended them to our customers through your LUBRIPLATE Tag Plan. Our experience shows that if the proper lubricants are used from the beginning, there are fewer problems and parts replacements later. We consider LUBRIPLATE to be the best possible ounce of prevention."—
H. G. Warrington, Vice-Pres.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

LUBRIPLATE is available in grease and fluid densities for every purpose... LUBRIPLATE H.D.S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

FREE PUMP ANALYSIS

Experienced hydraulic engineers will figure your exact pump needs without obligation...

You'll learn what size your pump should be... its required capacity for your installation... minimum and maximum power requirements... its output on 10%, 15% and 25% solutions of sand, gravel and water... and other facts you need to know when you have to pump.

Whether you've just struck water or want an analysis of an old pumping operation makes no difference. Amsco® hydraulic engineers will give you all the information you need, so that you can select a proper pump... one which will fit your particular requirements. Mail the coupon today.

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I want a free pump analysis without obligating myself in any way. Send information to:

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ances in advance for the quality of products available.

In answer to Mr. Royer's comment about "dusting" in the processing of soft aggregates, Mr. Rhoades pointed out that some producers are experimenting with reprocessing the residue with an eye to recovery of same for use.

Quarrying Vs. Mining

"Surface Quarrying Versus Underground Mining" was discussed by Hubert Risser, Department of Mining and Metallurgical Engineering, University of Kansas. Until the present day, Mr. Risser said, crushed stone producers have been able to supply the demand without employing underground mining methods or highly technical quarrying procedures. But increased demand for high purity stone will necessitate careful exploration of quarry sites and the utilization of improved techniques. Producers will find it necessary to work middle ledges or extract cleaner rock which can be done more advantageously by underground mining. Removal of overburden is also avoided in underground mining. By careful planning — consideration of position of the rock ledges, quality of the deposit, cost of operations etc. — a quarry site can be utilized to greatest advantage, Mr. Risser concluded.

Agricultural uses of limestone were discussed by Dr. William A. Albrecht, chairman, Department of Soils at the University of Missouri. Dr. Albrecht urged the limestone producers to acquaint themselves with the calcium and chemical needs of soils and what part limestone plays in rebuilding depleted crop land. Kansas and the Great Plains states, it was pointed out, have within their border soils which have a relatively high mineral content and the optimum amount of moisture necessary to bring about favorable chemical reaction between the soil and root systems to produce high food value. Much of this mineral content is being exhausted through unwise soil management, and Dr. Albrecht urged the limestone producers to acquaint themselves with soil requirements and then to guide the farmers in wise use of limestone on their farm land. At present, limestone is applied to remove soil acidity but by accident the soil is actually being fertilized through the return of important food elements such as calcium, magnesium, potassium and others, contained in the limestone.

Fitting in the man to overall plant production by showing him how his job fits into the picture was the theme of the topic, "Safety Problems and Practices," presented by J. V. Heenan,

Old Equipment Modernized With Speed-Trol

Speed-Trol with electric remote control, used in modernizing our stone cutting saw, increased production, reduced maintenance costs, improved employee morale by simplifying operations and improving safety, and required 75% less mounting space, reports P. J. Sarni, Vice-President, Freeport Marble and Tile Co., Inc. Speed-Trol replaced a cumbersome variable speed transmission, flat belt drive with tight and loose pulleys, and a clutch.

STERLING SPEED-TROL

GIVES YOU VARIABLE SPEED CONTROL NECESSARY FOR:

Equipment adaptation to: Sequence synchronization — operators' abilities — load variations due to differences in quantity, quality, weight, size, tension, hardness or shape of material to be processed, machined, conveyed, blended, mixed, etc.

Process control of: Temperature — viscosity — level — pressure — flow — etc.

Time control of: Baking — drying — heating — cooking — pasteurizing — soaking — chemical action — etc.

With Speed-Trol you get the maximum in production, plant efficiency, quality & profit.

20-page illustrated catalog... Sterling Speed-Trol, Slo-Speed, Klosd and Klosd-Tite Electric Power Drives. Write for catalog No. 208

STERLING ELECTRIC MOTORS

Plants: New York City 51; Chicago 35; Los Angeles 22; Hamilton, Canada; Santiago, Chile
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STURTEVANT MICRONIZER* GRINDING MACHINE

Grinds Materials To Any Micron Size Specification

NOW AVAILABLE FOR OUTRIGHT SALE

24" Size Capacities 1000 to 1200 lbs. per hour

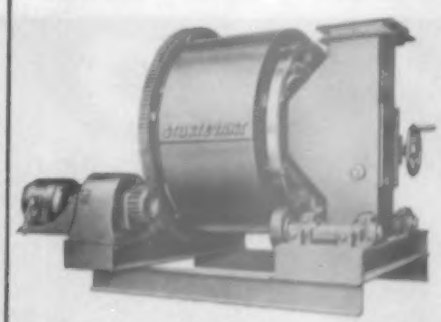
The Sturtevant *Micronizers* are fluid jet grinding machines designed to reduce solid materials to particle sizes in the micron range.

Using compressible fluids, air or steam, as the source of energy, *Micronizers* produce pulverized materials to specifications unobtainable by other mechanical equipment such as ball, pebble or hammer mills.

The variety of materials processed is large and includes both nonmetallic and metallic minerals and ores, metals, pigments, insecticides, fungicides, pharmaceuticals, plastics, dyes and numerous other organic and inorganic products.

It is quickly and easily cleaned on changes of formulation with minimum loss of material. Simple to install and operate. It is available as a machine alone . . . or as a complete grouping with premixing, grinding and bagging equipment. Write for complete information, today.

*Micronizer is the Registered Trademark of the Sturtevant Mill Company.



Sturtevant Dry-Batch Mixer for mixing materials into a homogeneous mass. 5 models: ¼ to 2 tons.

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Designers and Manufacturers of CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS
MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

Interesting group of 6 NEFF & FRY BINS

You see four bins in the photograph. There are two more of the 12 ft. dia. bins between the 20 ft. ones. All six are used for handling glass batch materials—lime, feldspar, silica sand, cullet, etc.

This is an example of the bins we construct all over North America for handling and storing scores of flowable bulk materials. In our long experience, we have designed structures and accessories to meet almost every conceivable situation.

The distinctive feature of a Neff & Fry bin is the diagonal, interlocking Super-Concrete Stave. Hoops of heavy galvanized steel rods cross the diagonals of two staves in each vertical tier. As many intervening hoops are applied as needed to give a safety factor of five to one.

Our bins do not spall, rust, rot, or burn. They do not require face-lifting.

You are invited to communicate with us for literature and specific data.

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280 ELM ST. • CAMDEN, OHIO

NEFF & FRY SUPER-CONCRETE STAVE STORAGE BINS

GYROSET VIBRATING SCREENS FOR SIZING — DEWATERING

POSITIVE ECCENTRIC ACTION
POSITIVE STROKE ADJUSTMENT

WITH ONLY 2 BEARINGS

For scalping and for raw material sizing. A rugged two bearing positive eccentric screen. Adjustable as to stroke from 0 to 3/8" for efficient economical service.

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training director of Monarch Cement Company, Humboldt, Kan.

Using the Monarch plant for which he works as an example, he outlined their approaches to safety problems — through meetings and by use of safety equipment. Safety practices can best be instituted through education and example rather than force, he stated. To establish the policy of wearing hard hats, for instance, some of the key men in the plant began wearing hard hats. Other men soon felt they were entitled to hard hats, also. This was followed by an explanation of why it is desirable or necessary to wear hard hats. A similar method was followed in establishing the wearing of safety shoes.

Homer Hennings, accountant, Ottawa, Kan., gave practical advice to the group concerning taxes and depreciation. He explained recent changes in income tax laws, the depreciation factor under the revised law, and steps that could be taken to obtain proper legal advantages. He expressed the opinion that, involved though some of the revisions are, they generally are favorable.

Administrative Assistant

JAMES N. DAVIS has been promoted to administrative assistant of the Portland Cement Association, Chicago, Ill., in addition to his duties as construction analyst. In his new position, he will work directly with the president, G. Donald Kennedy, and administrative officers of P.C.A. Mr. Davis is a graduate of the University of Illinois, Urbana, Ill., with a B.A. degree in economics and statistics. Prior to joining the Portland Cement Association, he was associated with the General Electric X-Ray Corp., Milwaukee, Wis.

Safety Congress Chairman

GRANT ORNDORFF, industrial relations director, Pittsburgh Plate Glass Co., Columbia cement division, Zanesville, Ohio, served as chairman of the section on cement, lime, quarry, sand and gravel at the recent 25th anniversary meeting of the All-Ohio Safety Congress and Exhibit in Cleveland, which was held under the direction of the Division of Safety and Hygiene, Industrial Commission of Ohio.

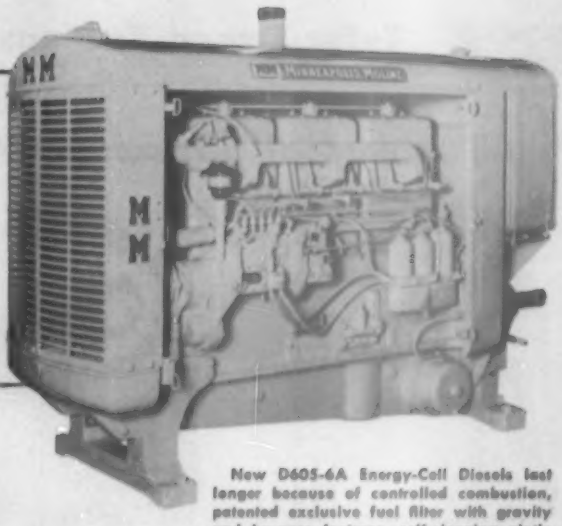
Manages Gypsum Operations

MICHAEL JAMES MESSEL has been placed in charge of the gypsum mining and manufacturing operations of The Ruberoid Co., New York, N. Y., in addition to his duties as general factory manager of the asbestos mine at Hyde Park, Vt. His new title will be coordinator of asbestos fibre and gypsum products.

WHY IT PAYS TO OWN INDUSTRIAL DIESELS WITH REMOVABLE CYLINDER BLOCKS AND HEADS

New MM diesels were developed with *energy-cells* to make them last longer, do more and go farther with less down-time and maintenance.

To provide owners with lower cost maintenance when necessary MM diesels are the most advanced and soundly engineered because the cylinder blocks are cast in pairs separate from the crankcase.

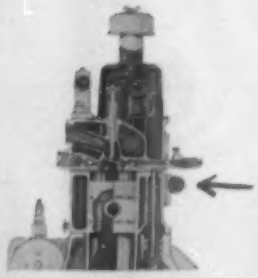


New D605-6A Energy-Cell Diesels last longer because of controlled combustion, patented exclusive fuel filter with gravity and by-pass features, self-cleaning pintle type nozzle, directed cooling of area around combustion chambers.

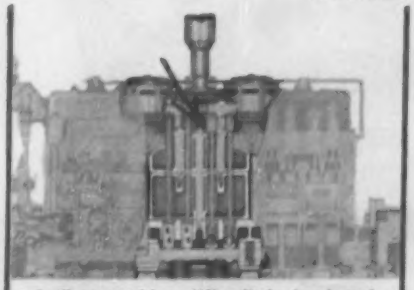
YOU GET THESE ADDED ADVANTAGES . . .

1. Ease of maintenance and low cost emergency service because paired cylinder blocks, pistons, and rods can be removed as a unit by one man.
2. Prolonged time between overhauls by use of close-grain cast iron that provides best cylinder lubrication for reduced wear.
3. Less service due to minimum distortion as MM cylinder heads, cylinder blocks and crankcase are virtually strapped together by full-length steel studs anchored in the main bearing bulkheads. (Transmits combustion pressure to heavy crankcase that has extra depth below center line of crankshaft.)
4. Efficient operation obtained by uniform cylinder expansion . . . the result of controlled cooling and long oil-cooled cylinder wall skirts below ring travel area.
5. "New engine" performance at extremely nominal cost can be obtained right in the field without special tools using factory matched cylinder blocks, pistons, pins, and rings. (Blocks are dowelled to crankcase to assure bore is square with crankshaft and pistons are precision fit to bore . . . equivalent to a factory job.)
6. Lower initial cost stems from high production parts by casting cylinder blocks in pairs separate from the crankcase.

D605-6A equipped with Thermo-Clad base pan.



1. Cylinder head and block assembly shows coolant entrance at hottest point first and extra long skirt wall construction.



2. Close-up of how MM cylinder heads and blocks and crankcase are tied into a single rigid unit with long studs.

3. A D283 feature is extra large oil filter enclosed in base pan, floating-screen oil pump intake, and pump located in bottom of base pan.

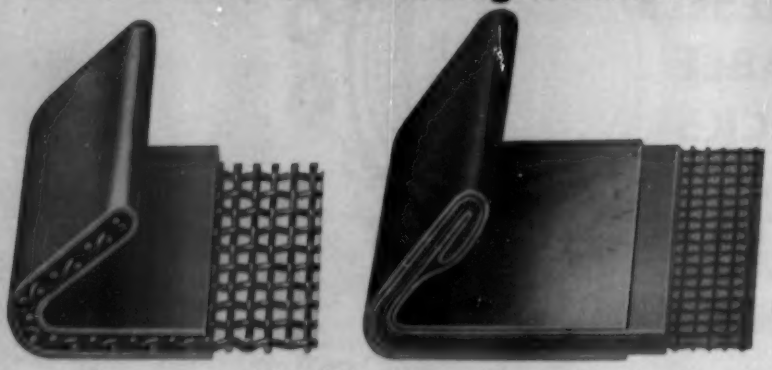
Optional Thermo-clad water-blanketed base pans for all units also have oil filter included to give more effective filtering.

INDUSTRIAL MM MINNEAPOLIS MOLINE MODERN MACHINERY DIVISION

MINNEAPOLIS-MOLINE

MINNEAPOLIS 1, MINNESOTA

Tyler Screen Sections for All Makes of Screening Machines!

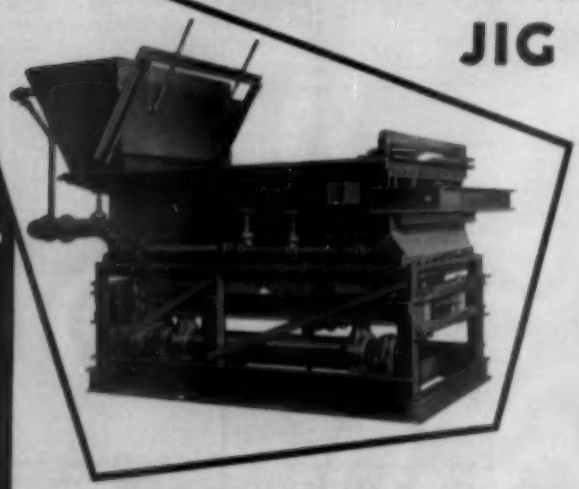


Screen sections of Tyler Woven Wire are fabricated for all makes of vibrating screens in any mesh or metal. They are made up with hook-strip or bent-edge construction to suit the machine on which they are to be used.

Tyler hook-strips make possible stretching and maintaining the screening at drum-head tension, which is essential for successful screening and long screen life.

THE W. S. TYLER COMPANY
CLEVELAND 14, OHIO
Manufacturers of Woven Wire Screens and Screening Machinery

THE MECKUM SAND AND GRAVEL JIG



REMOVES
WOOD
LIGNITE
OCHRE
SHALE
POROUS STONE
SOFT STONE
COAL
CHERT
CLAY

Improve your sand or gravel specifications at a low cost per ton. Of compact design, the Meckum Jig separates low from high specific gravity materials with a positive water and mechanical action.

Write us for details or nearest installation.

MECKUM ENGINEERING, INC.
53 W. Jackson Blvd., Chicago 4, Ill. Dayton Road, Ottawa, Ill.

MANUFACTURERS NEWS

Nopco Chemical Co., Harrison, N. J., has announced the election of Ralph Wechsler as president of the company to succeed Thomas A. Printon, who has been president since 1949, and will continue to serve as chairman of the board. Mr. Wechsler was graduated from the College of New York in 1916 with a B.S. degree in chemistry. He joined the company in 1921 as a chemist and a few years later became chief chemist, responsible for manufacturing operations. He was elected a member of the board in 1927, and in 1932 became treasurer, which position he has held until his election to the presidency. Mr. Wechsler will also act as chief officer of Metasap Chemical Co., a wholly-owned subsidiary.

Ralph Wechsler

Koppers Co., Inc., Pittsburgh, Penn., announces that W. F. Munnikhuysen has been elected chairman of the board and Fred C. Foy has been named president and chief executive officer, to fill the vacancies created by the death on February 13 of Gen. Brehon Somervell, who had been both chairman and president. Mr. Munnikhuysen has been executive vice-president and Mr. Foy has been vice-president and general manager of the tar products division. He will be succeeded by R. R. Holmes, who has been divisional vice-president and assistant general manager of the division. Theodore W. Chase has been named manager of the coupling department, metal products division.

Cummins Engine Co., Inc., Columbus, Ind., has announced the appointment of Paul J. Every as assistant general sales manager. Lloyd E. Williams, formerly Rocky Mountain regional manager, has been named to succeed Mr. Every as manager-distribution. R. R. MacDonald has been appointed manager of the Piedmont regional office at Greensboro, N. C., which consists of the states of Virginia, West Virginia, North and South Carolina.

Huber-Warco Co., Marion, Ohio, has announced the appointment of two divisional sales managers, Glenn N. Porter, who will direct sales east of the Mississippi in the United States, eastern half of Canada, and Cuba, and Joseph D. Wahlen, who will head sales activities in the western half of Canada and the United States, Mexico, Hawaii and Alaska. Mr. Porter was formerly with Huber Mfg. Co., now a part of Huber-Warco, and Mr. Whalen was district sales representative for the W. A. Riddell Corp., which recently merged with Huber to form Huber-Warco.

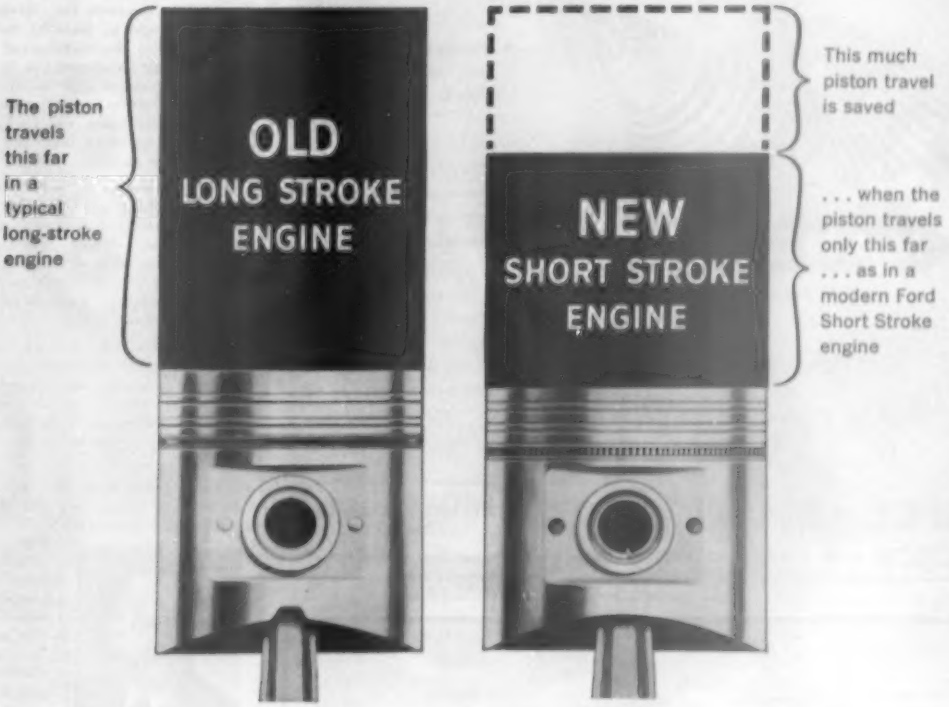
Raybestos-Manhattan, Inc., Passaic, N. J., announces that S. R. Zimmerman, Jr., a director and assistant general manager of the U. S. asbestos-grey rock division, Manheim, Penn., has been elected a vice-president, and R. J. Gorecki, factory manager of the Manhattan rubber division, has been named a director. H. H. Burrows has been appointed vice-president of rubber sales, and R. B. Hazard has been made sales manager of rubber and packing.

Gardner-Denver Co., Quincy, Ill., and Keller Tool Co., Grand Haven, Mich., have merged and Keller Tool Co. now becomes the Keller tool division of Gardner-Denver Co. E. V. Erickson, president of Keller, has been elected an executive vice-president of Gardner-Denver, and Gifford V. Leece remains as president.

Bucyrus-Erie Co., South Milwaukee, Wis., has announced the appointment of Edwin T. Gorce as assistant sales manager, excavator distributors. He will assist R. C. Adams, re-

Look under the hood!

Something **NEW** is happening to truck engine design . . .


The piston travels this far in a typical long-stroke engine
OLD
LONG STROKE
ENGINE
NEW
SHORT STROKE
ENGINE
This much piston travel is saved
. . . when the piston travels only this far . . . as in a modern Ford Short Stroke engine

The big news in truck engines is modern *short-stroke design.* Piston rings last up to 53% longer. Engine friction is cut as much as 33%. You save up to 1 gallon of gas in 7. Only Ford has Short Stroke design in *every* engine—V-8 or Six—in *every* truck.

Longer-lasting, modern Short Stroke power rolls the famous Ford F-700 BIG JOB. Short Stroke *Power King* V-8 with 140 horsepower gives you plenty of power for highway speed-hauling or off-the-road pulls with body, equipment and payload up to 15,204 lbs.! New maximum GVW is 21,000 lbs. with a choice of 5 wheelbases to fit any special body from 7½ to 19 feet.

Differences between outdated long-stroke engines and Ford's modern Short Stroke design may seem small, but actually they're *not.*

In one case, for instance, Ford's stroke is shorter by 1⅜ inches. A small matter? This shorter stroke means 2,090 miles *less piston travel per year*—per piston—in an average year's driving of 11,000 miles.

Less piston travel means less friction . . . less wear. And that means lower upkeep costs, longer engine life, greater gas savings and more usable power.

Be sure your next truck has a modern short-stroke engine that will not be outdated at trade-in time. You *will* be sure if it's a FORD Truck. Because Ford *and Ford alone* gives you a Short Stroke engine in every model.

Ford Triple Economy Trucks

THE MONEY MAKERS FOR '55

Be Wise . . . Economize

REBUILD WORN GYRATORY CRUSHERS with

MANGANAL

T. M. Reg. U. S. Pat. Off.

11½ - 13½% MANGANESE - NICKEL STEEL ROUND APPLICATOR BARS

- Costs less and gives longer service than new crushers.
- Brings efficiency of crusher back to peak performance fast.
- Minimizes down-time; cuts lost production hours.
- Quickly and easily attached with Manganal Welding Electrodes.

WRITE for literature on additional money-saving applications.

STULZ-SICKLES CO.

SOLE PRODUCERS 92 N. J. RAILROAD AVE. NEWARK, N. J.

NEAREST DISTRIBUTOR UPON REQUEST

ROCK PRODUCTS

Has the Largest ABC Circulation and Highest Renewal Percentage in the Non-Metallic Minerals Industry.

cently named sales manager of the distributor organization when L. E. MacDonald was promoted to general sales manager. John H. Plehn has rejoined the company as sales representative in the Seattle, Wash., office, where R. P. Brooks is northwestern sales manager.

Imperial Construction Equipment Co., Northlake, Ill., manufacturers of truck mixers, concrete block unloaders and concrete plant controls, announces the beginning of manufacturing operations in its newly constructed factory in North Lake City, Ill. Previous operations had been carried on at the former Imperial Ready Mix Concrete Co., Melrose Park, Ill., which was sold to Material Service Corp. in 1953. While in the ready-mixed concrete business, Imperial developed the Hydrocreter and has also developed and marketed the Tel-A-Slump. Imperial is now introducing a concrete block unloader which was shown for the first time at the Concrete Industries Exposition in Cleveland in January, 1955.

Merritt-Chapman & Scott Corp., New York, N. Y., has announced the election of Milton T. Smith as executive vice-president in charge of the equipment division, which comprises the Marion Power Shovel Co. and its subsidiary, The Osgood Co., of which he has been vice-president, general manager and a director since November, 1954.

C & D Mfg. Co., Perkins, Calif., manufacturers of Movall rock and earth-moving wagons, has announced the appointment of R. P. Nichols as general sales manager. He was formerly associated with Caterpillar Tractor Co. and R. G. LeTourneau, Inc., in engineering and sales.

Kennedy-Van Saun Mfg. & Eng. Corp., New York, N. Y., announces that F. O. Reedy has been elected president of the company to succeed J. E. Kennedy who has been named chairman of the board. Mr. Reedy has been vice-president and general manager for the past 20 years. Other officers elected are Byron Pyle, executive vice-president; Maurice Shafer, vice-president; Frank Irving, secretary-treasurer; Thomas McDermott and R. M. Kennedy, assistant treasurers; Ray Safian and John H. Bausch, assistant secretaries. Mr. Reedy joined Kennedy-Van Saun in 1920 after serving as production engineer with American Car & Foundry Co. He has had wide experience in the production of heavy machinery and is well known for his connection with Army and Navy Ordnance requirements.

F. O. Reedy

Mr. and Mrs. J. E. Kennedy at Mr. Kennedy's 92nd birthday party in Danville, Penn., April 12, attended by 400 friends and co-workers. Standing, left to right: Mr. Kennedy's daughters, Mrs. Gerald Ryan and Mrs. Byron Pyle

"Have owned nothing but LORAINS since 1928..."

Leon Meshberger

MESHBERGER STONE CO., INC., Columbus, Indiana, operates one of the largest quarries of its kind in the area, covering more than 75 acres. For 27 years only *one make* shovel has seen service in their quarry — and the name is Lorain. In the photo, their latest 1¾-yard Lorain shovel is digging against a 30-ft. face, loading from 900 to 1200 yards of limestone per day for road and agricultural use. It's the third time Meshberger has repeated with Lorain . . . and the 27-year-old Lorain No. 1 is still in use. Meshberger reports the performance of Lorains No. 1 and 2 sold him Lorain No. 3.

Records like this . . . and owner's praise for Lorains over many years . . . are proof that Lorains have what it takes for the toughest rock work. Lorains are built for that kind of duty . . . plenty of power to crowd full dippers . . . extra-sturdy and strong to steadily dig rock for years.

Your quarry will find that same satisfaction with Lorains. Your Thew-Lorain Distributor offers shovel capacities through 2½-yard sizes . . . and a wide selection of mountings to fit your needs. Now is the time to put profit-making Lorain performance to work.

THE THEW SHOVEL CO., LORAIN, OHIO

THEW LORAIN

1ST CHOICE OF MEN THAT DIG IN ROCK

Use REMA to add years of life to your Belts

REMA is the New and Amazing Self-Vulcanizing Rubber Repair Material

REMA REQUIRES
- NO HEAT
- NO HEAVY EQUIPMENT
- NO CURING TIME DELAY

• REMA is not just another cold patch. REMA is vulcanization by chemical process. The repaired area is sealed with an abrasive resistant cover stock patch. No heat or heavy vulcanizing equipment required. Here's the astonishing advantage—*when repair work is completed belts may be returned to service immediately.*

• REMA seals out moisture, reduces mildew, rot and deterioration — the great enemies of conveyor belts. Your own maintenance man can quickly repair your belt — it doesn't take a skilled belt mechanic to use REMA.

• Used for repair of all types of damaged spots, edge wear and for covering metallic joints. Available in introductory kits or parts separately.

Order from your Flexco-Alligator distributor

Write for Folder No. R4

FLEXIBLE STEEL LACING CO.
4684 Lexington St., Chicago 44, Ill.

REMA SELF-VULCANIZING RUBBER REPAIR MATERIALS

Allis-Chalmers Mfg. Co., Milwaukee, Wis., announces that James G. Winnette, a representative in the Milwaukee district office of the general machinery division, has been named manager of the Peoria district.

Caterpillar Tractor Co., Peoria, Ill., has formed a wholly-owned subsidiary in Sao Paulo, Brazil, named Caterpillar Brasil S.A., Maquinas e Pecas, with Robert J. Loskill as managing director. He was formerly sales development manager at Peoria.

Dorr-Oliver, Inc., Stamford, Conn., has announced the following personnel changes: C. W. Crumb, sales promotion manager; C. M. Comstock, assistant sales promotion manager; and A. L. Morris, director of public relations.

International Paper Co., New York, N. Y., has announced the appointment of Lamar M. Fearing and William S. Snyder as assistant general sales managers. J. H. Goodwin succeeds Mr. Fearing as sales manager of the fine paper and bleached board division, and Arthur Damon succeeds Mr. Snyder as general manager of the container division.

Fairbanks, Morse & Co., Chicago, Ill., announces that Robert H. Morse, Jr., president, has been named by President Eisenhower as a member of the Federal Commission for the Soo Canal Centennial Exposition which will be held in Sault Ste. Marie, Mich., for 72 days beginning June 28, 1955.

New York & New Jersey Lubricant Co., New York, N. Y., announces the appointment of Robert A. Henken as sales representative in the Pittsburgh and western Pennsylvania territory.

Macwhyte Co., Kenosha, Wis., announces the appointment of Francis D. Holden as manager of sales. He was formerly assistant general sales manager.

Jeffrey Mfg. Co., Columbus, Ohio, has opened a western territory sales office for the conveyor division in San Francisco, Calif., with Stanley M. Mercier as manager. For the past 15 years he has been chief engineer of the division.

Highway Equipment Co., Inc., Cedar Rapids, Iowa, has appointed Roy Gaddis, Jr., as assistant general manager, according to an announcement by Roy C. Gaddis, Sr., president.

Central Ohio Steel Products Co., Galion, Ohio, has announced the appointment of Floyd Baker as western regional sales manager of the Austin division in the states west of the Mississippi River, with headquarters in Denver, Colo. M. B. Crowley has been named eastern regional sales manager of the division in the states east of the Mississippi River, with headquarters at Galion, Ohio.

Galion Allsteel Body Co., Galion, Ohio, announces that Frank L. Hamilton has been appointed regional manager in charge of the Michigan, Ohio, western Pennsylvania, Kentucky and West Virginia territory.

Worthington Corp., Harrison, N. J., has promoted Roland W. Bartlett from sales engineer in the Washington, D. C., district office to manager of the Detroit district office.

American Cyanamid Co., New York, N. Y., announces that Charles B. Martin has been named district sales manager of the northeastern sales district of the organic chemicals division of the explosives department. He has been serving as sales representative and district sales manager of the New England states since 1934.

H. K. Porter Co., Inc., New York, N. Y., has announced the appointment of W. H. Parkinson as advertising, publicity and sales promotion manager of Quaker Rubber Corp., Philadelphia, Penn. He succeeds W. M. Taylor, who was promoted to the staff of H. K. Porter Co. at Pittsburgh, where he will be in charge of

for dredges and washing plants

flat undercurrent and round Trommel screens

made to your order by

YUBA

Accurately cut and drilled from U.S. Steel Abrasion Resisting plate to fit your exact job requirements. All thicknesses from 3/16". Other dimensions as big as your needs. Holes taper-drilled, unless straight sides requested. Hole sizes ¼" diameter or larger. Any hole spacing from one diameter or greater.

All YUBA screens are cut square to close limits and rolled true to insure proper fit and fast installation. Quick delivery from ARS plate in stock. Competitively priced. Sketches submitted for your approval on request.

For estimates and recommendations, wire, write or phone TODAY.

YUBA MANUFACTURING CO.
Room 717 • 351 California St. • San Francisco 4, Calif.

. . . CASTING FOR PROFIT—

There is probably only one good reason for your being in business. In the final analysis this reason can be summed up in one word — PROFIT. And that means each piece of equipment must show profitable operation — produce bigger performance — require minimum maintenance. Here, for instance, are two ¾-yard Model 45 machines — each doing its job in the production and handling of sand and gravel.

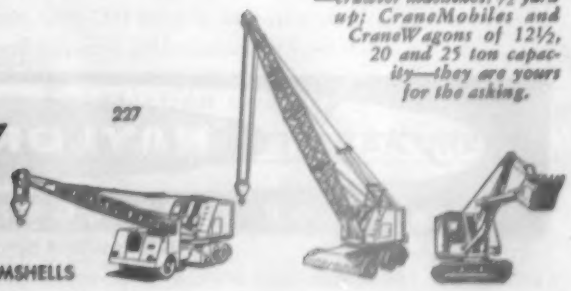
Glance at the dragline photo again and note how the bucket is cast far beyond the boom point. This illustrates the easy operation, free-running machinery and accurate control plus fine balance which is built into this heavy-duty dragline. It has long, wide crawlers, alloy-steel bases, tandem drums in ball bearings, helical-cut gears, 517-cu.-in. gas engine, booster clutches and many other time-saving, money-making features.

Why not get the complete story from your nearest BAY CITY dealer or write direct for catalog. BAY CITY SHOVELS, INC., Bay City, Michigan

Write for any of these catalogs —crawler machines, ½ yard up; CraneMobiles and CraneWagons of 12½, 20 and 25 ton capacity—they are yours for the asking.

227

BAY CITY



SHOVELS • CRANES • HOES • DRAGLINES • CLAMSHELLS

GOOD RIDDANCE

To get rid of tailings, excess water and other wastes, you can always count on Naylor Spiralweld pipe. Here's the one lightweight pipe that's built for easier handling and installation without sacrifice of performance strength. And with the one-piece Naylor Wedge-Lock coupling, connections are easier and faster, too. Whether it's air or water—high or low pressure service—it will pay you to look into the advantages of this distinctive, lockseamed, spiralweld pipe. Sizes from 4" to 30" in diameter. Thickness from 14 to 7 gauge. Write for Bulletin No. 507 on Naylor pipe and couplings.

NAYLOR PIPE

NAYLOR PIPE COMPANY

1237 East 92nd Street, Chicago 19, Illinois

Eastern U. S. and Foreign Sales Office: 350 Madison Avenue, New York 17, New York

advertising, publicity and sales promotion for both Quaker Rubber Corp. and Quaker Pioneer Rubber Mills. A. J. Lamond has been named manager of packing sales for Quaker where he has been serving as assistant to the belting sales manager.

Cummins Engine Co., Inc., Columbus, Ind., announces the appointment of J. P. Jung as southeastern regional manager, with headquarters at Atlanta, Ga. He replaces R. P. Parshall who has been named president of Cummins Diesel of Wisconsin, Inc., distributorship of Milwaukee.

Caterpillar Tractor Co., Peoria, Ill., has established a new parts depot in Los Angeles to service distributors in southern California, southern Nevada and Arizona. James Busey has been appointed manager and will be assisted by Robert Webster.

Chase Bag Co., Chicago, Ill., announces that H. E. Dennie has been named manager of the Philadelphia branch, where he has been sales manager since 1952. He succeeds J. P. Grady, who continues as eastern regional sales director. E. P. Alexander has been appointed sales manager of the Chicago office, and D. B. Fendler succeeds him as sales manager in Detroit.

Electric Steel Foundry Co., Portland, Ore., has appointed Fred J. Acord as district representative of the middle Atlantic territory, with headquarters in Baltimore, Md.

Hyster Co., Portland, Ore., announces that James R. Leep has been appointed service manager for the western division, in addition to his duties as western division parts manager. He succeeds Allan G. Owen, who has been named service manager in San Francisco, Calif.

Yale & Towne Mfg. Co., Philadelphia, Penn., has announced the appointment of J. Henry Brown as publicity manager of the materials handling division.

Borg-Warner Corp., Chicago, Ill., announces the appointment of Gerhard M. Rappich as sales manager of Borg-Warner International, export subsidiary of the company.

Union Asbestos & Rubber Co., Chicago, Ill., has announced the appointment of Frank D. Klein as manager of distributor development of the cooling division.

Hardinge Co., Inc., York, Penn., has announced the death on January 19 of John J. Cadot, executive vice-president at the age of 65. Born in Salina, Kan., Mr. Cadot attended Howe Military School, Howe, Ind., and graduated in 1915 from the Colorado School of Mines, Golden, Colo., with a degree in mining engineering. Two years later he joined Hardinge Co.

American Hoist & Derrick Co., St. Paul, Minn., has announced acquisition of the Thomas Laughlin Co., Portland, Me., manufacturer of forged wire rope accessories, Crosby clips and Crosby load rated wire rope blocks, as the Thomas Laughlin division of the company.

Harbison-Walker Refractories Co., Pittsburgh, Penn., announces that R. A. Buchholz has been named Pittsburgh district sales manager. He was formerly on the Cleveland district sales staff.

The Cleveland Crane & Engr. Co., Wickliffe, Ohio, announces the appointment of William J. Ryan as assistant to Herbert T. Florence, executive vice-president and general manager.

Robertshaw-Fulton Controls Co., has appointed the following sales representatives for the Fielden instrument division: H. J. Klug Co., Omaha, Neb., for Nebraska and western Iowa; Electro Products, Inc., replaces Nick Ruge Sales Co. in Indianapolis as representatives; Broger Instrument Sales Co., Inc., Boston,

cement mill liners in ABK METAL last longer

You can cut replacement cost of liners in primary, secondary or tertiary compartments—for wet or dry grinding of raw stone or finished product—with ABK Metal abrasion resistant liners.

Here are typical reports from operators who have experienced real savings. "ABK Metal outlasted chilled white iron 2.9 to 1". . ."ground an additional 1.5 million barrels before replacement" . . . "ABK liners tripled our interval between relinings" . . . "less downtime for replacements and lower labor maintenance costs".

Moreover, ABK liners maintain desired contours, providing maximum agitation and grinding motion in the mill.

Let us show *you* how ABK Metal—a nickel-chrome alloy of controlled structure with an extreme hardness (500-700 Brinell, as required)—can lower costs and improve performance in your mills.

for better protection against abrasion specify ABK METAL

American Brake Shoe Company

Baltimore • Chicago • Houston • St. Louis • San Francisco • Superior • Toledo

BRAKE SHOE AND CASTINGS DIVISION

230 Park Avenue, New York 17, N. Y.

I used to be troubled by that BULGE in the MIDDLE...

"Yes, the excess of middle sized sand was my major gradation problem. My former equipment just couldn't eliminate it.

...but now my BULGE PROBLEM is GONE...

"After working for years with inadequate equipment, I installed simple, flexible, Auto-Vortex Classifiers, (2 CONES and a BOWL) and here's the new trouble-free production record I'm making:

Mesh	42" CONE PRODUCT	60" CONE PRODUCT	15' BOWL PRODUCT
	% passing		
4	95.0	100.0	100.0
8	82.2	99.8	100.0
16	65.4	97.2	100.0
30	37.5	74.8	98.4
50	4.4	13.8	60.0
100	0.3	1.7	10.7

★ *These are actual records of an Auto-Vortex plant in current operation. Names of this and other plants with equally impressive records will be furnished on request.*

...there's where my MIDDLE BULGE WENT!

"83.4% of this product is the material that made my bulge in the middle. Now the bulge or excess of middle sized sand is automatically removed to become, itself, a valuable product. And now, I blend my 42" Cone (coarse) sand with the 15' bowl fines in the proportion required to meet ASTM specifications for my major product . . concrete sand.

"So with an additional valuable product, and full recovery of the fine sand that was formerly wasted . . . and with a sharp reduction in operating costs . . . my Auto-Vortex plan is giving me profits I never knew were possible. Yes, I got rid of the bulge problem and realized some wholly unexpected plus benefits besides.

What Sold Me on... AUTO VORTEX CLASSIFIERS

Trade Mark Reg.

"Why simply, what other users told me . . . men who had used them for 25 years and men who had recently installed them. Men whose problem was to eliminate excess fines, to eliminate the bulge in the middle, or just to recover formerly wasted fine sand. If you have any of these problems, write the Charles E. Wood Company for actual records of other plants that formerly faced your same problem."

Call or write the Wood Company today!

CHARLES E. WOOD COMPANY

906 NORTH WATER ST. • MILWAUKEE 2, WISCONSIN

Mass., in the Boston area. A. W. Rost has been appointed field sales representative in the northern half of Ohio and several counties in northwest Pennsylvania, with headquarters in Cleveland, Ohio.

The Teale Co., Omaha, Neb., manufacturers of hydraulically-operated buckets, dozer blades and scarifiers, has appointed the General Machinery Corp., Atlanta, Ga., as distributor in the southeastern states.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., and **Baker Mfg. Co.**, Springfield, Ill., announce that negotiations are under way toward acquisition by Allis-Chalmers of all assets of the Baker Co.

Continental Copper & Steel Industries, Inc., New York, N. Y., has acquired the Wooldridge Manufacturing Co., Sunnyvale, Calif., manufacturers of heavy earthmoving equipment, which will be known as the Wooldridge division. Henry Gusman, founder and former president of Wooldridge, has been named vice-president of C.C.S. in charge of the new division, as well as serving as a member of the management committee.

Rust Engineering Co., Pittsburgh, Penn., announces that C. Dana McCoy has been named New York manager and international director.

Pioneer Engineering Works, Inc., Minneapolis, Minn., has announced the appointment of Ralph W. Heer as vice-president of manufacturing. Harold E. Rollin has been named director of research and development, and Stanley J. Owens succeeds Mr. Rollin as manager of sales engineering.

Joy Mfg. Co., Pittsburgh, Penn., has announced the appointment of William F. Brady, formerly New England district manager, as manager of distributor sales, and J. E. Douglas, formerly sales engineer in the Phoenix area, as assistant district sales manager of the El Paso territory.

Columbia Machine Works, Vancouver, Wash., has just completed its fourth plant expansion in five years with the addition of a 10,000-sq. ft. concrete block building near the main plant.

The Bristol Co., Waterbury, Conn., has named John M. Maitland, a member of the New York sales staff since 1953, as manager of the Detroit district office.

The Dow Chemical Co., Midland, Mich., has formed a new section of technical service and development known as the industrial chemicals section with R. E. TenHoor as supervisor. J. P. Murphy has been transferred from the Chicago sales office to the sales development unit of technical service and development.

Atlas Powder Co., Wilmington, Del., has announced opening of its new general offices at Concord Pike and New Murphy Road in Wilmington.

Cleaver-Brooks Co., Milwaukee, Wis., has appointed Tamco Engineers, San Francisco, Calif., as representative in northern California and western Nevada.

Kaiser Aluminum & Chemical Corp., chemicals division, Oakland, Calif., plans construction of a $4 million plant to produce basic refractories at Columbiana, Ohio.

Reliance Electric & Engineering Co., Cleveland, Ohio, has announced acquisition of the Reeves Pulley Co., Columbus, Ind., which will become a division of the company.

Worthington Corp., Harrison, N. J., announces that Aloysius M. Tullo, formerly manager of the Harrison works, has been appointed general manager of the new Harrison division, where he will have charge of sales, engineering and manufacturing. Clarence K.

(Continued on page 179)

Convey, Screen or Distribute

• ROCK
• SAND • GRAVEL
• COAL • ORES • GROG
• COARSE AGGREGATE
• CORROSIVE MATERIALS

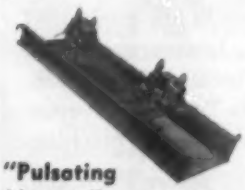
with

SYNTRON VIBRATING CONVEYORS

Extra length screening capacity plus dual trough design means bigger tonnage production with less floor space and easy installation. Counter-balanced, swinging mass operation cuts power consumption — eliminates slow-downs under sudden load susges,

Flat pan or tubular trough models in lengths from 14'3" up to 174'.

— other SYNTRON EQUIPMENT that keeps production costs down —

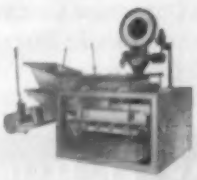


"Pulsating Magnet" VIBRATING SCREENS

Heavy tonnage sizing and scalping with very low operating cost. Replaceable screen surface. Electromagnetic, fingertip controlled operation. Easy to install—no heavy building supports needed.

WEIGH FEEDERS

For controlled, accurate feeding by weight. Correct load variations automatically. Electronic controls — low cost — continuous operation.



TEST SIEVE SHAKERS

For quick accurate sieve analysis. Positive control of time and speed for uniform testing of samples.

VIBRATING GRIZZLIES

High speed, controllable feeding and scalping in one operation. Clean, low cost separation of materials. Electromagnetic—no mechanical wearing parts.

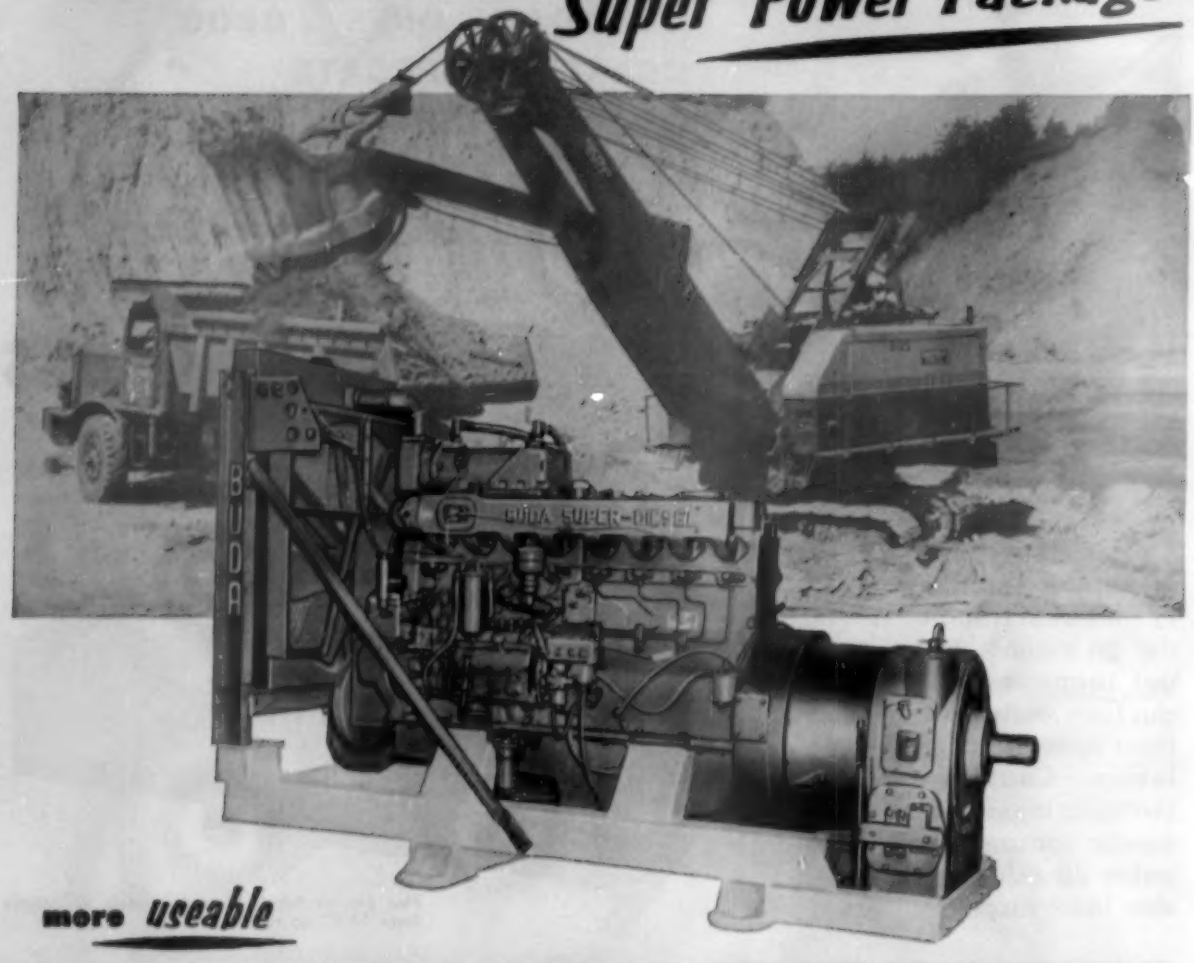
GASOLINE HAMMER Rock Drills

Self-contained — 2000 powerful blows per minute with automatic rotation of drill bit. Drills holes up to 2" in dia.

Write today for complete catalogue data — Free

SYNTRON COMPANY
450 Lexington Avenue — Homer City, Penna.

Buda Diesel Torque-Converter Super "Power Package"



more *useable*

horsepower and torque . . . . for faster, smoother shovel operation

The great new Buda 8DAS-1290 Supercharged Diesel Torque Converter Power Unit is engineered for the continuous, high lugging service shovel work demands. It's shovel power that packs a smooth punch.

Because the Buda Diesel Torque Converter Unit automatically matches its tremendous power and wide range of torque to speed hoisting, swinging and traveling operations, shovels and cranes do more work.

Downtime and maintenance costs are minimized too — transmissions, clutches, brakes, cable and drums stay in service longer, because the smooth, cushioned fluid drive of a Buda Torque Converter Unit is easier on all working parts of the machine.

***Before** you re-power or specify power for a new shovel, crane or dragline, get the Buda Diesel Torque Converter Unit story. It's worth knowing. Your nearby Buda Distributor can give you complete details now.*

BC-33

BUDA DIVISION • HARVEY, ILLINOIS

ALLIS-CHALMERS MANUFACTURING COMPANY

Hood, vice-president, will be division sales manager. Vincent Gerbereaux has been named general manager of the newly established standard pumps division. He was formerly manager of the centrifugal pump division of the general sales department.

Sterling Electric Motors, Inc., Los Angeles, Calif., has announced the appointment of Charles E. Cotham, Jr., as district manager for the Houston, Texas, territory.

Pioneer Engineering Works, Inc., Minneapolis, Minn., has appointed the following distributors: Cook Bros. Equipment Co., Los Angeles and Oakland, Calif., in California and southeastern Nevada; Choctaw, Inc., Memphis, Tenn., in Mississippi, northeastern Arkansas and western Tennessee; and Brock Tractor Co., Buffalo, N. Y., in western New York.

Traylor Engr. & Mfg. Co., Allentown, Penn., has received orders for five gyratory crushers, one 60-in. primary and four 36-in. Bulldog secondary, for use in the Erie Mining Co.'s taconite beneficiation plant being erected near Aurora, Minn. It is claimed the 60-in. gyratory is the largest and heaviest ever built by Traylor. It will have a 60-in. feed or receiving opening and a 102-in. dia. crushing head which it is said will crush pieces of hard taconite down to 12-in. size. The outside diameter of the crusher will be 20-ft. 8-in. and the height from foundation to top will be 24-ft.

American Manganese Steel Div. of American Brake Shoe Co., New York, N. Y., has appointed Nelson M. McGuire as assistant to the vice-president for sales in addition to handling advertising for Amsco.

The Heil Co., Milwaukee, Wis., has appointed the following vice-presidents: William E. Curran, in charge of administration; John G. Eimermann, in charge of finance; Leo W. Conrad, in charge of manufacturing; Robert G. McDonald, in charge of industrial relations; John D. Barclay, in charge of sales. Maurice Hanley has been appointed district sales representative in Iowa, Nebraska, Kansas and Missouri.

Blaw-Knox Co., Pittsburgh, Penn., announces plans to move the parts and services department from Springdale, Penn., to Mattoon, Ill., in late 1955, with C. W. McIntyre as manager of the department.

Hewitt-Robins, Inc., Stamford, Conn., has appointed L. C. Holloman, Jr., as manager of the central sales region, with headquarters in Chicago, Ill. He has been assistant manager of the south-central sales division since 1952.

H. K. Porter Co., Inc., New York, N. Y., has named Fred S. Shumaker as district representative of the Michigan sales area for the Leschen wire rope division.

The Monarch Rubber Co., Hartville, Ohio, announces that Robert J. Himmelright, Jr., has been promoted from assistant sales and advertising manager to the position of assistant to the president, and that William H. Filter, formerly executive assistant to the treasurer, has been appointed sales manager for the southern and western sales territories.

Heat & Power Co., Inc., New York, N. Y., has moved its office to the Lincoln Building, 60 East 42nd St., New York, N. Y.

Lime Production

SUBSTANTIAL GAINS IN LIME PRODUCTION were recorded in 1953 for chemical, industrial and refractory uses, according to the Bureau of Mines. Sales of both building and agricultural limestone declined in 1953, and the number of producing plants dropped from 160 to 156. Lime sold and used by producers in the United States, including Hawaii and Puerto Rico, during 1953, is as follows:

	Tons Sold	Tons Used	Total
By type:			
Quicklime	6,242,759	1,389,324	7,632,083
Hydrated Lime	1,871,637	170,463	2,042,100
Total	8,114,396	1,559,787	9,674,183
By use:			
Agricultural:			
Quicklime	123,087	———	123,087
Hydrated Lime	206,368	———	206,638
Total	329,455	———	329,455
Building:			
Quicklime	150,315	52,399	202,714
Hydrated Lime	948,453	15,073	963,526
Total	1,098,768	67,472	1,166,240
Chemical and other industrial:			
Quicklime	3,706,606	1,304,861	5,011,467
Hydrated Lime	716,816	155,390	872,206
Total	4,423,422	1,460,251	5,883,673
Refractory (dead-burned dolomite)	2,262,751	32,064	2,294,815

RESISTO-LOY will lengthen life of

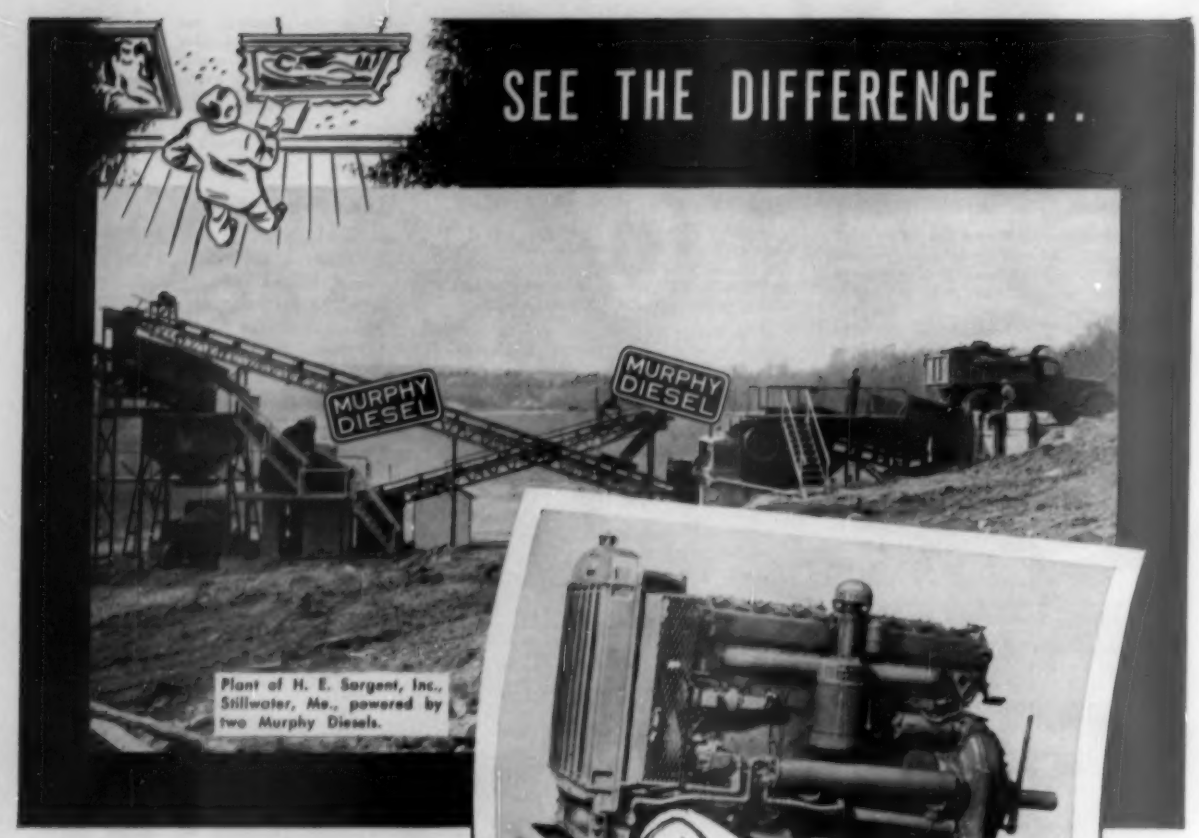
CONE CRUSHER LINERS 50% or more

There are many types and sizes of Cone Crusher Mantles, and most of them can be hard-surfaced with RESISTO-LOY to extend their life by 50% or more.

This type of liner should be given a single application of RESISTO-LOY when new. No attempt should be made to rebuild this type of liner when badly worn. A single application of RESISTO-LOY costs but a fraction of the cost of a new liner.

This job is NOT recommended for the plant maintenance welder, as special equipment is required to handle these liners during the application of RESISTO-LOY. Ask our field man to visit you and show you how to effect this important saving.

RESISTO-LOY CO., INC., MFRS., Grand Rapids 7, Michigan



. . . when you put

MURPHY DIESEL

in the picture!

When you bring Murphy Diesel into your operating picture, you see a big difference in many ways.

You'll see the difference in your fuel cost records — because the Murphy Diesel costs less to operate than any other engine of comparable size.

You'll see the difference in down-time — because the Murphy Diesel is a heavy duty engine, designed and built for continuous service.

You'll see the difference in output — because the Murphy Diesel delivers the kind of power that enables you to get the most work out of any plant.

Check the experience of other rock operators and then ask your Murphy Diesel Dealer to show you what a difference a Murphy Diesel will make in your picture.

MURPHY DIESEL COMPANY

5315 W. Burnham St. • Milwaukee 14, Wisconsin

Sales, parts and service throughout the nation

MURPHY DIESEL

Heavy duty power

for rock crushing

Murphy Diesel Engines and Power Units for rock crushing, 96 H.P. to 296 H.P. Generator Sets, 64 K.W. to 165 K.W.

326

Engineer of the Year

EDWARD J. NUNAN, materials engineer and sales manager of The Buffalo Slag Co., Buffalo, N. Y., has been named "Engineer of the Year" by the Erie County Chapter of the New York State Society of Professional Engineers. He is a former president of the chapter and a past president of the state Society.

Buffalo Slag Officers

HARRIS N. SNYDER, vice-president, treasurer and general manager, has been elected president of the Buffalo Slag Co., Inc., Buffalo, N. Y. He succeeds L. A. Beeghly, who has been named chairman of the board. Gerald S. Snyder has been appointed to succeed Mr. Snyder as vice-president in addition to his duties as manager of production and purchases.

Association Director

DR. T. A. MEYER, agronomist, has been appointed managing director of the National Association of Silo Manufacturers. Dr. Meyer holds degrees in agriculture from the University of Alabama, University, Ala., and Ohio State University, Columbus, Ohio.

Manager Resigns

LLOYD N. BEUTHEL has resigned as manager of the Sandusky, Ohio, plant of Kelley Island Co., Cleveland, Ohio. He has been manager since 1939 when he succeeded the late Fred Ohlemacher as manager of the Kelley Island Lime and Transport Co.

Special Representative

ROGER GLEASON, formerly president and general manager of the Wolverine Portland Cement Co., has been appointed a special representative of the Union Bag and Paper Corp., New York, N. Y.

Roger Gleason

Whatever the job... it can be done quicker—more profitably with DIAMOND

CRUSHING, SCREENING, WASHING and CONVEYING EQUIPMENT

Our catalogs fully describe the equipment that increases production and lowers costs. Get the facts now.

PORTABLE AND STATIONARY CRUSHING PLANTS
CATALOG D-48A Quarry Plants
CATALOG D-104 Reter-Lift
CATALOG D-5415 "77" All American Plant
CATALOG D-103 Single Pass Gravel Plant

JAW CRUSHERS — CATALOG 600
ROLL CRUSHERS — CATALOG D-5413

SCREENS AND WASHERS
CATALOG D-5412
Scalping and Scrubbing Screens
Vibrating Screens • Drag Washers

CONVEYORS
CATALOG D-5416
Portable and Stationary Conveyors
Belt Conveyors • Conveyor Rolls
Bucket Elevators

FEEDERS AND BINS
CATALOG D-101
Plate Feeders • Apron Feeders
Grizzlies • Bins and Hoppers

DIAMOND GENERAL LINE OF PRODUCTS
CATALOG D-106

Write for name of your Diamond Distributor

DIAMOND IRON WORKS
division
GOODMAN MANUFACTURING COMPANY
Halsted Street and 48th Place • Chicago 9, Illinois

Everything for the aggregate producer.

HETHERINGTON & BERNER

DREDGING PUMPS

performance-proven on the toughest jobs

Hetherington & Berner sand and gravel pumps are available in two general types: *STANDARD*, (4", 6" and 8" sizes) with semi-steel parts, for ordinary working conditions and moderate heads; and *DREADNAUGHT*, (6", 8", 10", 12" and 15" sizes) with manganese steel parts, for heavy duty jobs with stringent head conditions.

Write for Bulletin DP-147.

HETHERINGTON & BERNER INC.

735 Kentucky Ave. Indianapolis 7, Indiana

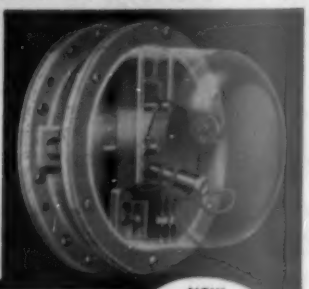
BIN-FLO AERATING UNIT

Provides Steady Flow of Dry, Finely Ground Materials which tend to bridge in storage. Uses only small amount low-pressure air.

BIN-DICATOR BIN LEVEL INDICATOR

For All Bulk Materials

signals change in level; automatically starts and stops filling and emptying equipment.

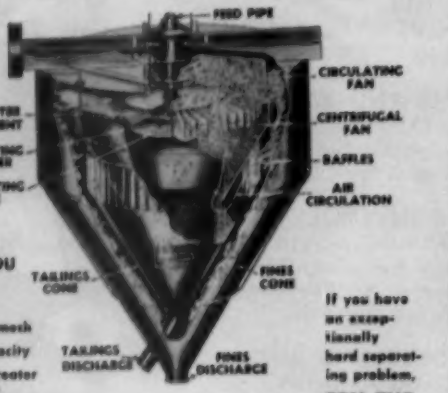


THE BIN-DICATOR CO.

13946-F Kercheval • Detroit 15, Mich.

NEW DETAIL DATA BOOK FREE

GAYCO CENTRIFUGAL SEPARATORS



GAYCO BRINGS YOU All These!

- Range 60 to 400 mesh
- Greater Capacity
- 25 to 30% greater production
- Cleaner Tailings
- Uniform Products
- Slow speed for slow wear
- Quick and easy adjustments

"TIMKEN BEARING EQUIPPED"

If you have an exceptionally hard separating problem, **TRY THE GAYCO.**

Closer separations are possible with the Exclusive Gayco Centrifugal sizing fan. Higher production results from a more complete removal of the fines made by the mill. The efficient Gayco sizing eliminates all undesirable oversize from the product.

UNIVERSAL ROAD MACHINERY CO.

Robert M. Gay-Division
Factory and Laboratory, Kingston, N. Y.
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Canadian Representative: F. H. Hopkins & Co., Ltd.
8500 Decarie Blvd., Montreal, Que.

Rotary

DRYERS

COOLERS

KILNS

Increase the capacity and efficiency of your plant

McDERMOTT BROS. CO.

THIRD AND WASHINGTON STS.
ALLENTOWN, PENNA.
Established 1895

Here's a typical service record of BLAW-KNOX CLAMSHELL BUCKETS

This 3-cu. yd. lever arm bucket is still in service after 14 years on the job . . . a typical work record for Blaw-Knox Clamshell Buckets.

Over 50 years experience has taught Blaw-Knox engineers the fine points of bucket manufacture . . . where to build in the extra strength to withstand the abuse of severe conditions . . . how to design buckets to meet the exacting needs of an exacting industry . . . how to analyze *your* job requirements to help you select the specific size, weight and type of bucket you need.

There are Blaw-Knox Buckets designed for excavating, dredging and the rehandling of over 480 listed materials! Ask your Blaw-Knox distributor to help you select the right bucket for your job.

BLAW-KNOX

BLAW-KNOX COMPANY
BLAW-KNOX EQUIPMENT DIVISION
Pittsburgh 38, Pa.
Offices in Principal Cities

ASK ABOUT THE BLAW-KNOX "Complete Package" OF CONCRETE PAVING AND READY-MIX EQUIPMENT

Highway and Airport Paving Forms • Precision Subgraders • Aggregate and Bulk Cement Batching Plants • Concrete Spreaders and Finishers • Concrete Pavers • Road Wideners • Base Pavers • Bituminous Pavers and Finishers • Tandem and Trench Rollers • Truck Mixers • Truck Mixer Loading Plants • Concrete Buckets • Curb, Gutter and Sidewalk Forms.

Superior Grinding Equipment Since 1891

BRADLEY PNEUMATIC HERCULES MILL

For FINE grinding of limestone, phosphate rocks, etc.

Provides a uniform grind from 20 to 325 mesh. Floor level installation provides easy accessibility . . . lowest installation and maintenance costs. Durable, non-clogging vibratory feeder for dependable, worry-free operation. Material with excessive moisture can be dried within the mill system.

BRADLEY HERCULES MILLS

SCREEN TYPE

- **For SEMI-FINE grinding of agricultural limestone**
  From rough to finish in one low-cost operation.
- **For producing superior feed material for tube mills grinding cement raw and clinker.**

Rugged, dustless construction, maximum accessibility, keep maintenance costs at an absolute minimum. Automatic electric feed control eliminates manual operation.

For complete information, write for catalogs

Bradley PULVERIZER CO.
LONDON ALLENTOWN, PENNA. BOSTON

designers and builders of equipment for basic industries

IMMEDIATE DELIVERY
VALVES

McNally Pittsburg valves are made of the finest selected materials for high resistance to the corrosive action of sludges, slimes and slurry waters.

McNally Pittsburg valves are made in a wide range of sizes for both hand and motor operation. Recommendations for the best type for your needs will be made on request.

For Basic Industries McNally Pittsburg offers:

• SERVICES •

Engineering Design Field Erection
Research & Development

• EQUIPMENT •

Conveyors Pug Mills
Crushers Screens
Dryers, Centrifugal and heat. Pumps, Valves, Piping
Washers, heavy media and jig Car Hauls, Dumpers
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McNALLY PITTSBURG MANUFACTURING CORPORATION

• OFFICES •

Pittsburgh, Pa.
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• PLANTS •

Pittsburg, Kansas Wellston, Ohio

MANUFACTURERS OF ROCK CRUSHERS SINCE 1885

15 to 30 TONS PER HOUR plus*

Crushing Rock or Gravel

GRUENDLER SINGLE PASS
PORTABLE 14 x 24 JAW CRUSHER

★ PLUS —
★ LOW WEIGHT ★ LOW COST
★ LOW POWER ★ SMALL—COMPACT

The ideal unit for small jobs, County road maintenance, etc.

BULLETIN MAILED ON REQUEST

GRUENDLER
CRUSHER & PULVERIZER CO.

2915 N. MARKET ST. RP6 ST. LOUIS 6, MO.

In a Hayward, there's no contact between the closing mechanism and the material handled. This means much less wear, reduced upkeep, big savings in bucket maintenance. THE HAYWARD COMPANY, 50 Church St., New York 7, N.Y.

HAYWARD BUCKETS

CLAM SHELL • ELECTRIC • ORANGE PEEL • GRAPPLES

famous for performance since 1888

BANKRUPTCY SALE

By Virtue of Acquisition We Will Sell the Assets of the

ELDRED STONE COMPANY
ELDRED, ILLINOIS

on SATURDAY, JUNE 11, 1955, at 12 Noon C. D. S. T.

Consisting of

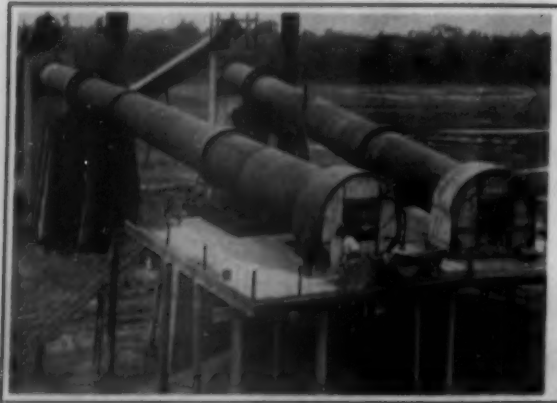
6 ACRES OF LIMESTONE QUARRY AND COMPLETE TIPPLE

Smith #9E, Austin #5 and #3 Gyratory crushers, Sturtevant #2 Ring Rolling Mill, Iowa 18x30 Crushing Rolls, Universal #18 Pulverizer, Double Vibrating Screens, Gas and Diesel Engines, 24x84 belt Conveyors, 50 Ft. Bucket Elevators, Air Compressors, Wagner and G. E. 125 h.p. Motors, Caterpillar Bulldozer, P & H Cranes, Lime Spreaders, Dump Trucks.

Inspection:
Friday, June 9th

For further information wire or write

ACE AUCTIONEERS & LIQUIDATORS, INC.
672 W. Roosevelt Rd., Chicago, Illinois CAnal 6-0181



Biggest Lightweight Aggregate Kiln Built by VULCAN

Big or small—THE VULCAN IRON WORKS makes certain that each job measures up to the standard of quality and responsibility that has taken years to earn. You can bet that if your equipment comes from VULCAN you will have nothing to worry about. Why not inquire today; there is no obligation.

VULCAN IRON WORKS
WILKES-BARRE, PA.

N. Y. Office—50 Church St. Cable: VULWORKS, WILKESBARRE

CONCRETE PRODUCTS

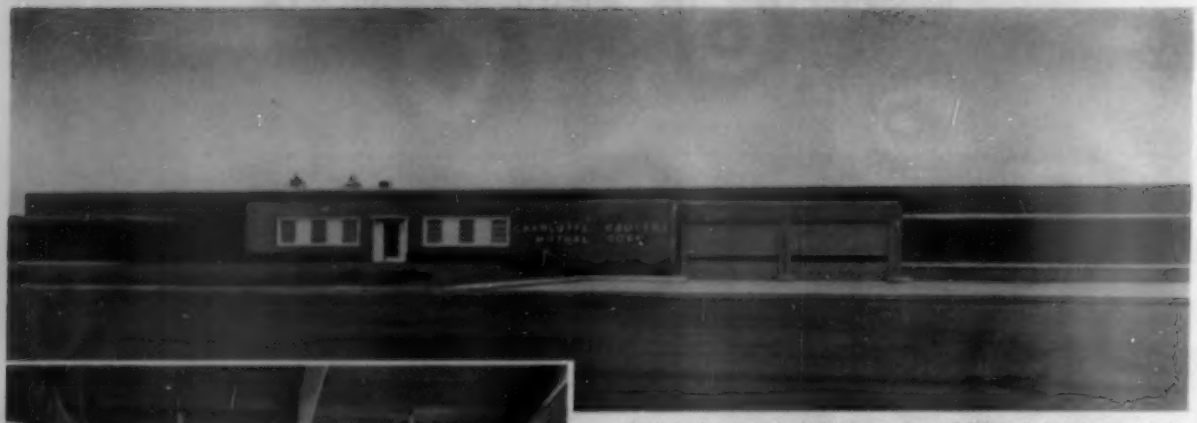
A SECTION OF ROCK PRODUCTS

CONCRETE UNITS · READY-MIXED CONCRETE

Ready mix, block and prestressed products produced by Jackson Ready-Mix Concrete, Jackson, Miss.

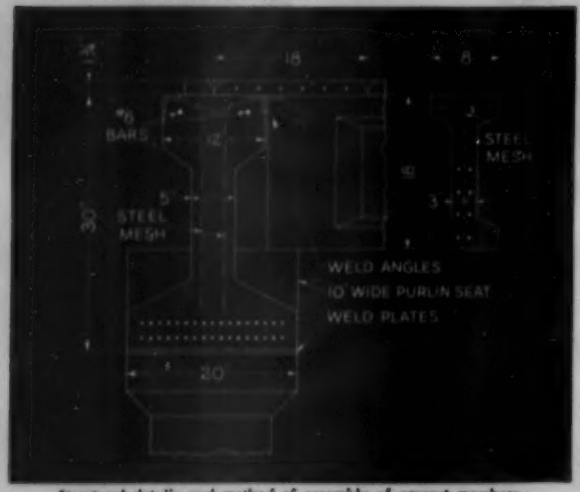
ERECTED COST OF PRESTRESSED CONCRETE MEMBERS...

$1.10 PER SQ. FT.



Charlotte Grocers Mutual Warehouse. Area, 60,000 sq. ft. Prestressed concrete members made by Concrete Materials Inc.; Architect and Engineer, J. N. Pease and Co.; General Contractor, J. A. Jones Construction Co., all of Charlotte, N. C.

Specially designed for the material and method, lowest construction cost was achieved plus the fire resistance and durability that spell both minimum insurance and upkeep.



Structural details and method of assembly of precast members.

THAT'S THE GOOD NEWS about the new Charlotte Grocers Mutual Warehouse in Charlotte, N. C. . . . erected cost to the owner for precast columns plus precast prestressed girders, purlins and deck slabs was only $1.10 per sq. ft. And for the technically-minded, here are some of the data:

Live load—30 pounds per sq. ft.;
Tension elements—Roebling 7-wire stress relieved uncoated prestressed concrete strands;
30" girders on 45' span have thirty-four ¼" strands;
18" purlins on 24' span have eight 5/16" strands;
18" x 1¾" x 18' deck slabs have six ¼" strands and span 9' c. to c. purlins;
Concrete—6000 psi ready-mix high-early;
Deck finish—grout joints between slabs.

Roebling engineers, leaders in the development of prestressing techniques and tensioning elements in America, will be glad to give you full information on tensioning materials and fabrication methods for this and other types of prestressed concrete structures. And they will always welcome the opportunity to cooperate with you to help assure maximum efficiency on any specific application of this economical and outstandingly modern structural material. Write Construction Materials Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

INDUSTRY NEWS

Cover Picture

ON THIS MONTH'S CONCRETE PRODUCTS COVER is an aerial view of Jackson Ready-Mix Concrete, Jackson, Miss., one of the largest and most modern ready-mixed concrete, concrete block and prestressed concrete plants in the South. This company recently installed an 8- x 100-ft. long autoclave for high pressure steam curing. Thirty transit mixer trucks are operated. The Prestressed Concrete Division will be started in June to manufacture long span roof and bridge decks and other structural members.

Florida Association

THE FLORIDA CONCRETE AND PRODUCTS ASSOCIATION, a recently organized group of ready-mixed concrete, concrete block and concrete products producers of Florida, will hold its first annual convention at the Fountainebleau Hotel at Miami Beach, June 12 and 13. The program will feature organization matters, and speakers will be heard representing various phases of the concrete industry. Temporary officers of the association are: W. J. Hicklin, Capitol Concrete Co., president; Ernest Kilgore, Pinellas Concrete Co., first vice president; Neilson Jones, Maule Industries, second vice president; and Frank Williamson, Holloway Concrete Products, secretary-treasurer.

Concrete Products Plant

TEXAS INDUSTRIES, INC., Dallas, Texas, has acquired the Houston concrete products plant of Alatex Construction Service, Inc. The plant manufactures concrete masonry units, lintels, joists, roofing tile, and other building products. Holiday Hill Stone, FulVent windows, Texcrete masonry coatings and other materials will be added to the line. The acquisition brings the total number of Texas Industries plants to 30, in Texas, Oklahoma and Louisiana.

Modernizes Block Plant

ELMORE CONCRETE PRODUCTS CO. has expanded and modernized its concrete block and tile plant at Elmore, Minn. A new plant was built of concrete and glass block, and a new boiler installed. Power lines, safety devices and additional lighting have been added. A cement storage tank was also installed

Expands Operations

CLYDE MCMAHON CONCRETE CO., Big Spring, Texas, has added a permanent crushing plant to its ready-mixed concrete and sand and gravel facilities. The company also manufactures concrete building block, Holiday Hill stone, and haydite concrete tile. A 7-cu. yd. transit mixer was recently added, bringing its fleet to seven, the rest of which are 3-cu. yd. capacity units. The firm also operates six dump trucks and two cable trucks.

Expansion Plans

TEXCRETE STRUCTURAL PRODUCTS CO., an affiliate of Texas Industries, Inc., has announced expansion of its present facilities at Dallas, Texas, costing approximately $125,000. Another $548,000 will be spent for additional facilities, and $350,000 has been set aside for working capital. The Texcrete plant manufactures monolithic structural concrete products.

Concrete Plant Opens

WHITE LAKE CONCRETE PRODUCTS CO. has started operations at its plant near Montague, Mich., producing ready-mixed concrete, gravel and torpedo sand. Facilities include bulk cement storage bins, elevators, conveyors, aggregate bins, transit-mixer trucks and dump trucks. Future plans call for a railroad siding and year-round operation of a heated aggregate plant. John A. Keith is president of the company.

On Sales Trip

PAUL KLEMENS, assistant sales and export manager for Columbia Machine Works, Vancouver, Wash., has been on a two months' trip through Latin America. His itinerary included the Bahamas, West Indies, Venezuela, Colombia, Ecuador, Peru, northern Chile, Buenos Aires, Rio de Janerio, northern Brazil, the Guianas, Panama, Central America and Mexico City.

Paul Klemens

PERRY CONCRETE PRODUCTS CO., Perry, Fla., formerly owned by Frank Warren, has been purchased by Perry Industries, a recently established corporation headed by Byron Butler. B. L. Glass, secretary-treasurer of the new corporation, is manager of the concrete products firm.

CONCRETE MATERIALS, INC., has established a second ready-mixed concrete plant at Charlotte, N. C., serving Charlotte and Mecklenburg County. The firm also operates a precast, prestressed concrete building products plant at Charlotte, manufacturing precast, prestressed concrete girders, purlins and roof slabs.

NORTHWEST MATERIALS, INC., Bryan, Ohio, have purchased the Flegal Ready-Mix concrete plant near Angola, Ohio. The purchase included three conveyor units and a 12-acre gravel deposit. Glenn J. Pierman is president of the firm, and D. N. Harmon is general manager.

FLORIDA MODERN CRETE, INC., St. Petersburg, Fla., has started operations at its recently built precast concrete products plant at Winter Garden, Fla. The plant has a capacity of 1000 ft. of precast concrete products daily.

MADISON CONCRETE PRODUCTS CO. has established a concrete culvert and sewer pipe plant at Madison, Wis., utilizing a patented German vibration method. Harry Steirs is president of the company.

TEXAS INDUSTRIES, INC., Dallas, Texas, has acquired Mineral Products Co., Kansas City, Kan. The plant produces lightweight aggregate from clay, under the trade name "Lite-Wate."

FRITZ'S READY MIX, owned by Frederick G. Smith Co. of Freeport, Ill., has begun operations at a ready-mixed concrete plant in North Forreston, Ill. Earl George is plant manager.

LANARK BLOCK AND READY MIX has started operations at its plant at North Forreston, Ill. Lloyd Rogers, of Lanark, Ill., is plant manager.

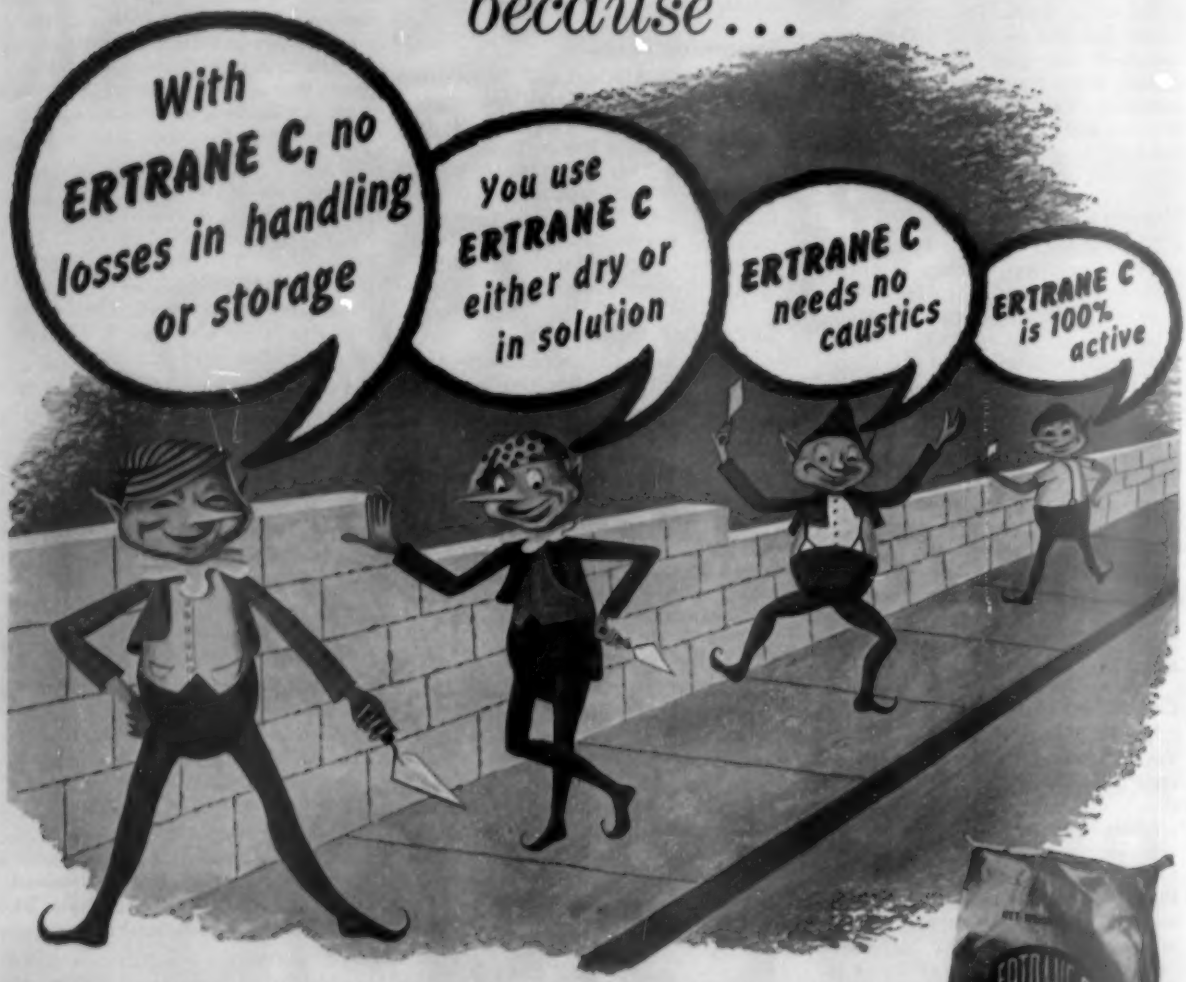
THE GREEN BROTHERS company has announced the opening of a ready-mixed concrete plant at Morgan, Colo.

WM. B. SMITH AND SONS, owners and operators of a concrete block plant at Montgomery, Mo., have added a ready-mixed concrete plant to their present operations.

PACIFIC COAST AGGREGATES CO. has been granted a permit to build a concrete batching plant at Cache Creek near Yolo County, Calif.

WELK CO., Seattle, Wash., is manufacturing precast concrete steps, with non-skid knobs on the treads.

Air-entrained concrete costs less with ERTRANE® C because...


With ERTRANE C, no losses in handling or storage
you use ERTRANE C either dry or in solution
ERTRANE C needs no caustics
ERTRANE C is 100% active

You're going to save real money per cubic yard of air-entrained concrete when you use Ertrane C, Nopco's quality air-entraining agent.

Here's how you save, as proved in practice by leading cement manufacturers and concrete mixers:

1. No caustics needed. Unlike some powdered additives, Ertrane C makes a uniform solution in either hot or cold water, *without* adding caustics to neutralize.

2. Ease of handling and storage. Ertrane C is packaged in a 60-lb. multiwall bag. No danger of freezing or caking.

3. Lower freight rates. Ertrane C is 100% active; you are not paying freight on water.

4. Flexibility of use. Ertrane C can be used either dry or in solution. 3 bags (180 lb.) of Ertrane C into 125 gallons of water makes a 15% solution.

Write today for complete information on Ertrane C. Nopco Chemical Company, 606 Industrial St., Harrison, N. J.

NOPCO

PLANTS: Harrison, N. J.
Cedartown, Ga. • Richmond, Calif.

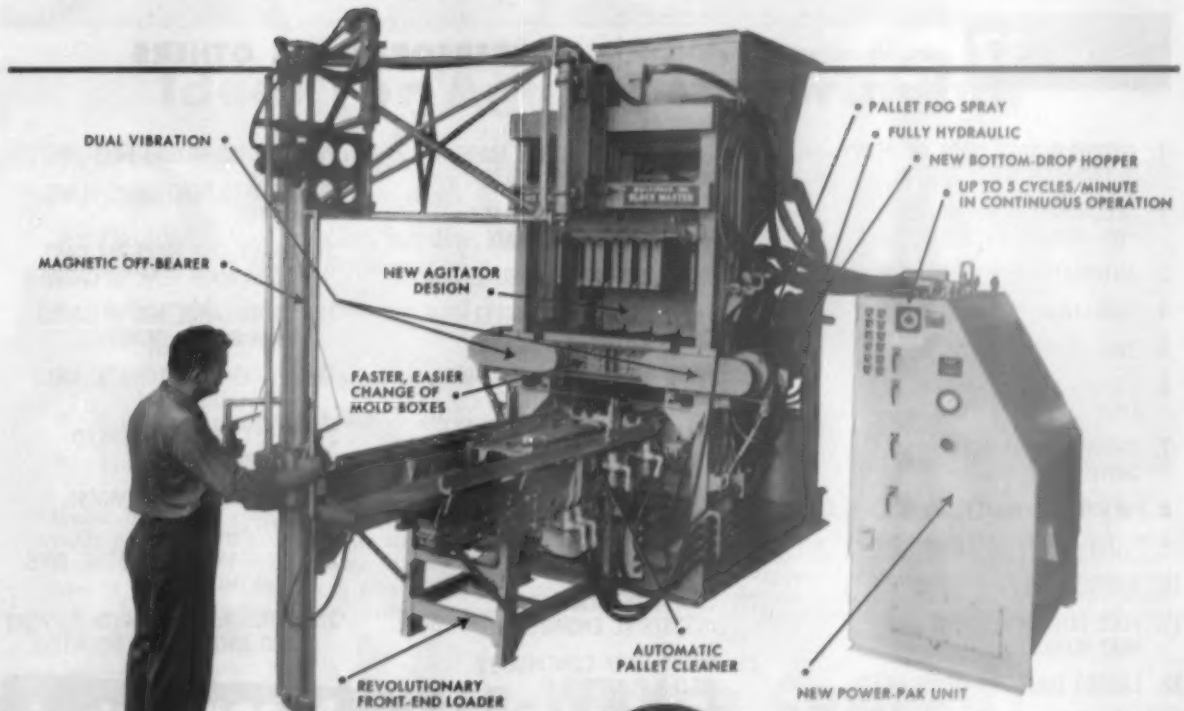
take another look

at the all new BLOCKMASTER "3"

THIS IS THE BLOCK MACHINE YOU'VE BEEN WAITING FOR! There's none to compare. It is fast . . . automatic . . . streamlined . . . easy to operate. Designed to make accurate 4, 6 and 8-inch high block at lowest possible cost, the new Blockmaster "3" is manufactured on an efficient "assembly line" basis . . . and *priced* accordingly.

Engineered for safe one-man control . . . hydraulically operated for smooth dependable performance, Blockmaster "3" is the simplest, most economical block machine available today. Field tests prove it requires minimum maintenance because it has fewer operating parts. In fact . . . it's the talk of the trade!

Write for New Bulletin 301 and name of nearest plant . . . or call BRoadway 1-2919



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Multiplex Machinery Division

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OUTPERFORMS ALL OTHERS

1. MIXING BLADES MADE OF HEAVY 3/16" HIGH TENSILE STEEL
2. SECONDARY DISCHARGE FINS FOR SMOOTH, EVEN DISCHARGE
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4. CHALLENGE 'MIXOMETER"
5. TWO-SPEED OPERATION
6. LARGER DRIVE CHAIN, OFFSET LINK TYPE
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8. "JET FLOW" WATER SYSTEM
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10. RUGGED BOX TYPE FRAME
11. FULL LENGTH FENDERS AND MUD GUARDS
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13. LARGER REAR OPENING
14. UNOBSTRUCTED REAR OPENING
15. DOUBLE DRUM HEAD
16. FRONT DRUM SECTION MADE WITH 3/16" STEEL PLATE
17. REAR DRUM SECTION MADE WITH 3/16" STEEL PLATE
18. NEW "ANTI-RATTLE" CHUTE LOCK
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21. BETTER WEIGHT DISTRIBUTION. SHORTER CENTER OF GRAVITY
22. LARGEST NICKEL ALLOY STEEL DRUM SHAFT IN THE INDUSTRY
23. CAB CONTROL
24. CHOICE OF STANDARD INDUSTRIAL ENGINES
25. HEAVY DUTY CONTINUOUS WATER PUMP
26. "L SHAPE" DISCHARGE BLADES
27. SIMPLIFIED CONTROLS
28. ONE PIECE FOLDING CHUTE
29. REVERSE MIXING FINS
30. EASY TO READ SIGHT GLASS GAUGE
31. HEAVY, ONE PIECE ALL CAST STEEL MAIN BEARING CARRIER
32. EXTRA LARGE SELF-ALIGNING MAIN ROLLER BEARINGS
33. PRECISION AUTOMATIC WELD CONSTRUCTION
34. "FAST FLOW" OVERHEAD LOADING HOPPER
35. PROVED STURDY LOADING HOPPER SUPPORT
36. STANDARD AUTOMOTIVE TYPE TRANSMISSION
37. INTEGRAL FRONT DRUM SUPPORT AND ANGLE DRIVE MOUNTING

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Ideal For Aggregate Grinding

- Delivers up to 30 yards per hour.
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- Adjustable to meet volume and size requirements.
- Requires only minimum maintenance.
- Gives years of trouble-free service.
- Has low power consumption.

Huber-Warco Grinders range in capacity from 4 to 75 yards per hour. Whatever your capacity requirement, there's a Huber-Warco Grinder exactly suited to your type of aggregate. Ask for a non-obligating consultation with the Huber-Warco grinding specialist . . . write, wire or phone.

HUBER-WARCO NO. 9 GRINDER

This 30 yard per hour capacity grinder has been designed to give big-volume aggregate production with a minimum of grinding costs. The suspended yoke mounted mullers are adjustable to any height, and for finer grinding, the grinding surfaces run together.

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HUBER-WARCO COMPANY

MARION, OHIO, U. S. A.

Road Machinery

CABLE ADDRESS: HUBARCO

ROAD ROLLERS • MOTOR GRADERS • MAINTAINERS • GRINDERS

"Look before you leap"

Before you buy, lease or replace block equipment, get the full facts on

BERGEN TRI-MATIC

All this...

DURABILITY
RUGGEDNESS
POWER
PRODUCTION
SERVICE

and-
You choose Your terms:

1. CASH
2. TIME PAYMENTS
3. "LEASE-WITH-OPTION-TO-BUY" CONTRACT
(NON-ROYALTY, FIXED MONTHLY PAYMENT)

BERGEN
MACHINE & TOOL CO., INC.
NUTLEY, NEW JERSEY

Cable Address: "BERGENCO" (Nutley, N. J.)

Quality Concrete doesn't just happen . . . it's premeditated. Whether it's PRE-MIXED or TRANSIT-MIXED . . . the first step toward success is CONTROL . . . (1) material control (2) water control (3) mixing. Wherever you see a Smith Tilter, you know the owner insists on *all three* and delivers Quality Concrete. Smith Tilters are available in ANY size you want . . . 1 cu. yard . . . 2 cu. yards . . . 3 cu. yards . . . 4 cu. yards . . . 5 cu. yards . . . 6 cu. yards . . . 7½ cu. yards.

Ask your nearby Smith dealer for literature.

THE T. L. SMITH COMPANY, 2885 North 32nd Street, Milwaukee 10, Wisconsin, U. S. A.

Affiliated with Essick Manufacturing Company, Los Angeles, California

BUILDERS OF BETTER MIXERS FOR MORE THAN 50 YEARS

1907...

a famous date in construction

...the first white portland cement MEDUSA WHITE was used for making white concrete garden products

On this historic date the first commercial white portland cement was given to the concrete products field for making garden and other white concrete products. After years of intensive research Dr. S. B. Newberry had accomplished his life-long quest for quality portland cement that was white, consequently far more beautiful than any other cementitious material. And equally important, his method of making Medusa White cement was so inexpensive that concrete products manufacturers were able to adapt it to a multitude of uses. Within a short time Medusa White became the accepted way for making ornamental cast stone and concrete, white cast stone trim and sculpture.

Within a few years it was standard practice for finer white and tinted concrete blocks, tile brick and stone, road markers and curbing, and cast stone veneer.

The pure "diamond blue" whiteness of Dr. Newberry's cement is something that just couldn't be improved. No other cement in the half century since its perfection has ever equaled the white color of Medusa White or done more to improve the beauty of concrete products. It's no wonder that concrete products manufacturers from coast to coast select this finer "diamond blue" white cement to make products of the finest quality. Write today and let us give you complete information on how to make more beautiful white and colored cement products.

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1000 Midland Building • Cleveland 15, Ohio

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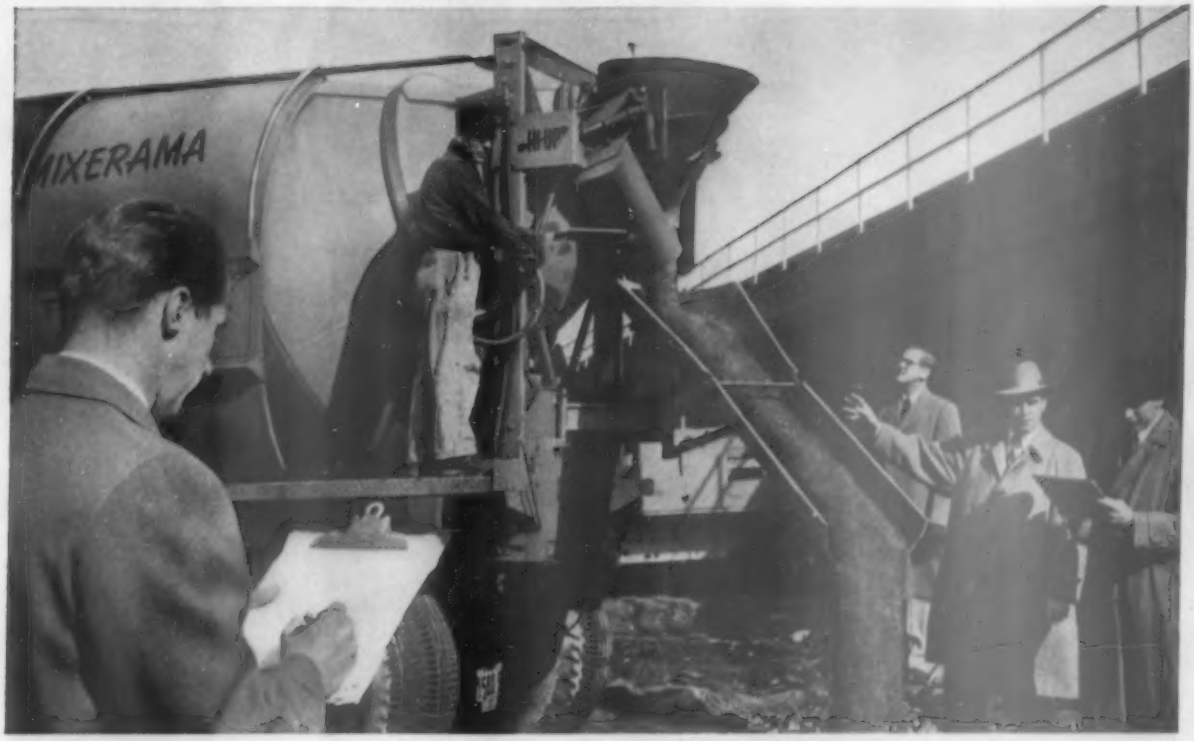
WHITE TILE GROUT CEMENT

MAKERS OF AMERICA'S FINEST PORTLAND CEMENTS FOR OVER SIXTY YEARS



Don't buy any other truck mixer till you've seen

Worthington MIXERAMA!

"On-Your-Job" demonstration shows why Worthington's HI-UP Truck Mixer does a better job

We believe the best way to prove to you that no other truck mixer can match a Worthington Hi-Up is to let you watch one at work.

We call this down-to-earth demonstration Worthington MIXERAMA. You'll call it the real test of truck mixer performance. Worthington distributors across the country want you to be their guest at one of these fascinating shows.

What will you see?

- You'll see exactly how Worthington Hi-Up Truck Mixers are designed for maximum payload.
- You'll see how fast it discharges . . . even with low-slump concrete.
- You'll see a really *rugged* transmission — *specifically designed* for a truck mixer. Single-lever operation.

Be our guest — or we'll be yours

You can watch Worthington MIXERAMA in one of two ways:

1. You can tell your Worthington distributor you want to see a Hi-Up in action on your own stamping grounds — loading at your plant, delivering concrete to your customers. And make sure you pick a day when you've got a *tough* pouring job to do!
2. You may attend a MIXERAMA in your area. The distributor will tell you where and when.

Call your distributor now

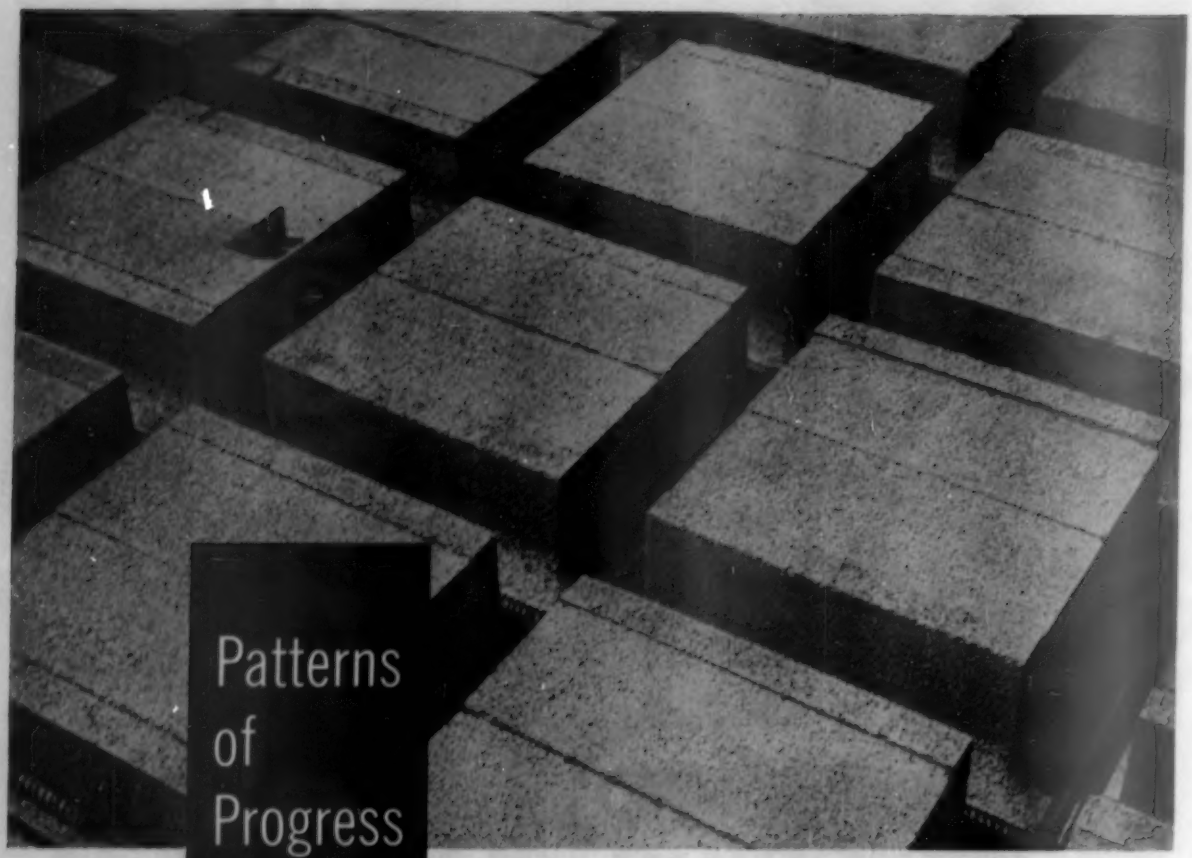
Make arrangements today to see Worthington MIXERAMA — either working from your batching plant or from a Ready-Mix plant in your area. You'll be glad you did — almost as glad as you'll be when you can call one of these hardworking truck mixers your own. Worthington Corporation, Concrete Machinery Division, Section R.5.1, Plainfield, N. J. R.5.1

MIXERAMA'S on the way to you!

WORTHINGTON

If it's a Concrete Job, It's a HI-UP *Job*

Rock Drills • Wagon Drills • Pavers • Concrete Mixers • Portable Pumps • Portable Compressors



Patterns of Progress

Lightweight concrete blocks in position before placing reinforcing and concrete to form a Yoetz-Slick lift slab.

Limestone Township H.S., Bartonville, Ill.

Contractor: C. Iber & Sons, Inc., Peoria, Ill.

Architect: Hewitt and Seetion Peoria, Ill.

Concrete Units: Iriana Concrete Block Co., Chillicothe, Ill.

Dealer: Builders Products Co., E. Peoria, Ill.

As an integral part of the slab, the blocks form a waffle ceiling with acoustical properties.

for the Concrete Products Manufacturer

Modern designs using new and out-of-the-ordinary applications of concrete units make patterns of progress for the resourceful concrete products manufacturer. The unique waffle ceiling formed by this lift slab design is an indication of things to come in the ever-expanding construction picture.

In your own sales territory, a study of construction needs may reveal opportunities never thought of before . . . ready to pay off in easy profitable sales for you.

And remember, to make products that give complete satisfaction, include Lehigh Cements in your plans. There's a Lehigh Cement to help you produce quality units with any manufacturing process.

LEHIGH
PORTLAND CEMENT COMPANY
Allentown, Pa.

LEHIGH PORTLAND CEMENT • LEHIGH EARLY STRENGTH CEMENT
LEHIGH AIR-ENTRAINING CEMENTS • LEHIGH MORTAR CEMENT

More ready mixed concrete is sold in
JAEGER truck mixers than by any other method

20,000 CUBIC YARDS — A CUBIC YARD A MINUTE IN PLACE: The project is a Robert Geiser & Son development of 300 homes at Denver, Colorado, all with full basement and three bedrooms. Besides foundations, basements and walks, there are 7 miles of curb and gutter — a total of 20,000 yards of concrete.

With Jaeger "Mix Plus" truck mixers and 10-man crew, Walt Flanagan poured 1000 ft. of curb and gutter a day, including grading and form setting. Trucks were spotted, discharged, washed down and away in an average of 5 minutes, including 3 minutes for actual placement of 5 yards of stiff concrete in the extended forms.

More ready-mixed concrete is sold in Jaeger truck mixers than by any other method. Ask your Jaeger distributor to show you why — or write us for complete information.

THE JAEGER MACHINE COMPANY

603 Dublin Avenue, Columbus 16, Ohio

FRONT END LOADERS • COMPRESSORS • PUMPS • CONCRETE MIXERS • PAVING MACHINES

Why Batch Away YOUR PROFITS?

Midwest Supply Company finds New Heltzel Automatic Cement Plant with Batchmaster Batcher has perfect record in dispensing 40,000 barrels

Boardman Supply Co., Youngstown, O., checked the record after batching some 44,000 bbls. of cement through their Heltzel Combination Plant. The record; a 15 bbl. plus—the result of the overage cement producers normally provide in their shipments. What makes this story even more amazing is the fact that Boardman was batching small amounts (600 lb. average) on a 5000 lb. scale.

As for speed, Boardman can weigh out 5½ yards of dry material, and the necessary water in 14 seconds—discharge it in 17 seconds. As for handling savings, they can put together all materials necessary for batching a yard of concrete for less than four and one-half cents.

This story can be duplicated whether your needs are for a single or multiple material plant, stationary or portable, for yard or highway use. Why not make sure you have the fastest, most accurate equipment possible. Don't chance losing time and profits with inferior equipment. Specify Batchmaster Plants by Heltzel.

The Heltzel Steel Form & Iron Co.
35000 Thomas Road, Warren, Ohio

HELTZEL *Batchmaster* **BATCHING PLANTS**

Special loading hoppers on a rolling track for three separate discharging heights, including a dry batch collecting hopper for dispensing to batch boxes. Water is introduced simultaneously.

A single operator controls entire operation of filling plant, measuring and dispensing. He can weigh all materials, including water and discharge 5½ yards of concrete in 30 seconds.

Compact Batchmaster Batchers for both aggregate and cement. Cement Batcher is sealed. Aggregate Batcher features air-operated clamshell gates. Sealed weighing apparatus has automatic recording device.

Better get

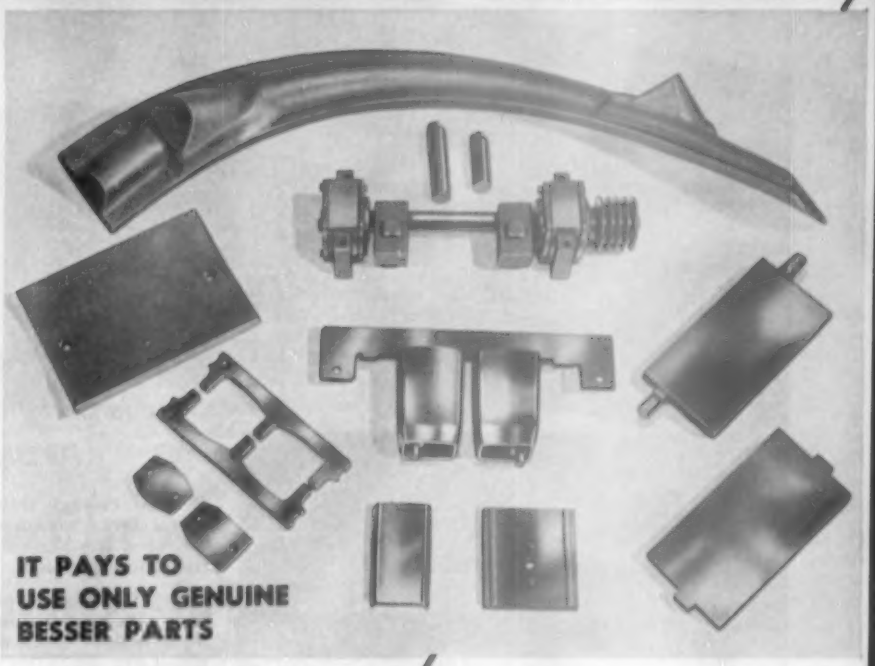
GENUINE BESSER PARTS

save money . . . get better block . . . more block production

Giant continuous pusher type carburizing furnace . . . "big as a house" . . . 40'x15'x10' . . . essential to Genuine Besser Parts.

Here's what Genuine Besser Parts mean to block plants: Less "downtime" in block-plant production . . . more and better quality block . . . practical protection of plant investment (because one "imitation" part might force many other parts to fail).

Continuous belt type tempering furnace.



Besser's Rockwell, Brinnell and Scleroscope Machines scientifically test all heat treated parts for hardness and tensile strength.

Genuine Besser Parts are identical to the parts used in manufacturing Besser Vibrapac Block Machines. Each part has the right alloy steel . . . proper heat treating . . . specified tensile strength . . . grain refinement and is properly engineered for long service and quality performance.

Actually, Genuine Besser Parts cost less, last longer and assure maximum speed and accuracy in block production. Needless waste of materials and poor quality block may be caused by inferior parts. Savings made by replacing them with Genuine Besser Parts actually pay for the parts by avoiding waste and assuring continuous production of high quality concrete block. Contact your nearest Besser Parts Store for Genuine Besser Parts.

Every Besser VIBRAPAC deserves GENUINE BESSER PARTS.

BESSER

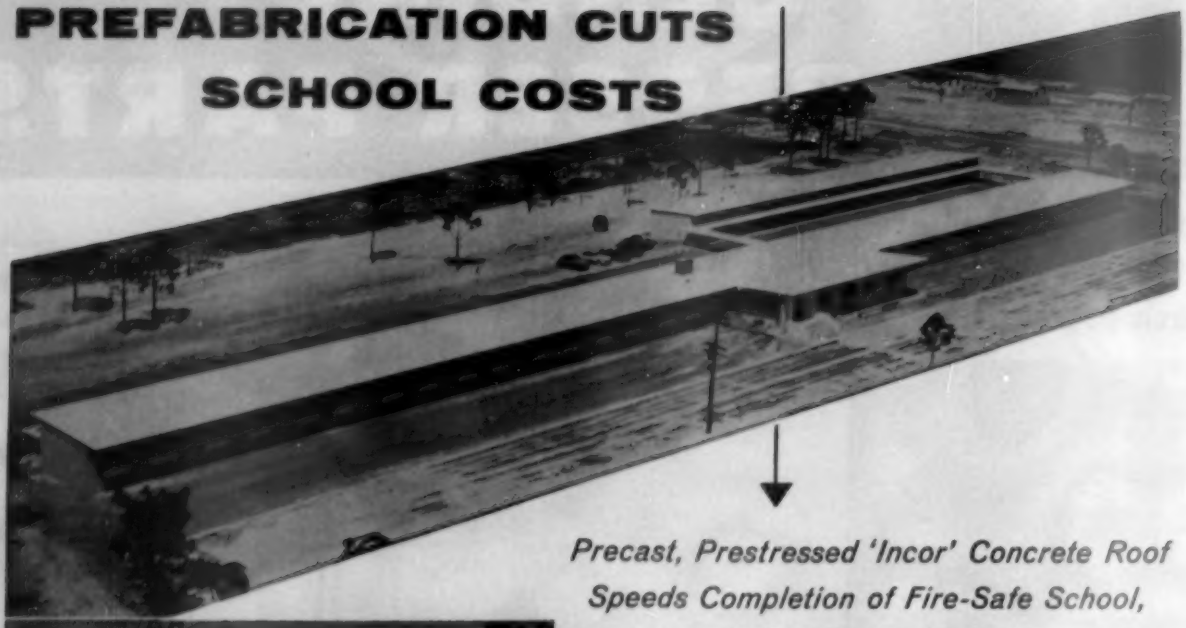
World's Leading Manufacturer of Concrete Block Machines

BESSER COMPANY

Box 135, ALPENA, MICHIGAN, U.S.A.

Complete Equipment for Concrete Block Plants

PREFABRICATION CUTS SCHOOL COSTS



Precast, Prestressed 'Incor' Concrete Roof Speeds Completion of Fire-Safe School, At Big Saving in Cost

● With enough children being born every fifteen minutes to fill a classroom, and a million pupils in sub-standard quarters, the nation faces a race against time in solving the school problem.

Fort Lauderdale comes up with a sound solution. Dillard Elementary School, with 21 classrooms and about 25,000 sq. ft. of floor space, was completed 18 weeks ahead of schedule. Cost, $273,000.—$38,500. under the appropriation.

Built of fire-safe concrete, speed and economy pivoted on the roof system, consisting of 32,000 sq. ft. of double-tee, precast, prestressed roof slabs, 221 in all. Each slab is 34½ ft. x 4 ft., with 23 ft. clear span and 6 ft. cantilever on one side, 4 ft. on the other.

With ten hours' steam-curing, dependable 'Incor'* high early strength produced 4000 psi in 20 hours for pre-tensioning and stripping immediately thereafter . . . 11,000 sq. ft. of roof slabs placed in an eight-hour day . . . electric conduits and outlet boxes precast in the slabs.

Double-tee design gives pleasing beam effect. Quality concrete, with smooth exposed roof and ceiling surfaces, only required painting to finish.

Another example of attractive, fire-safe construction, faster and at less cost, thanks to the two I's —Ingenious design and 'Incor' performance.

*Reg. U. S. Pat. Off.

DILLARD ELEMENTARY SCHOOL
FORT LAUDERDALE, FLA.

Supervision:
BROWARD COUNTY BOARD OF PUBLIC INSTRUCTION

Architect:
VAN W. KNOX, JR.

General Contractor:
CALDWELL-SCOTT ENGINEERING & CONSTRUCTION CO., INC.

Precast, Prestressed Units

Designed by:
LAKELAND ENGINEERING ASSOCIATES, INC.
Lakeland, Fla.

Made and Installed by:
R. H. WRIGHT & SON, INC.

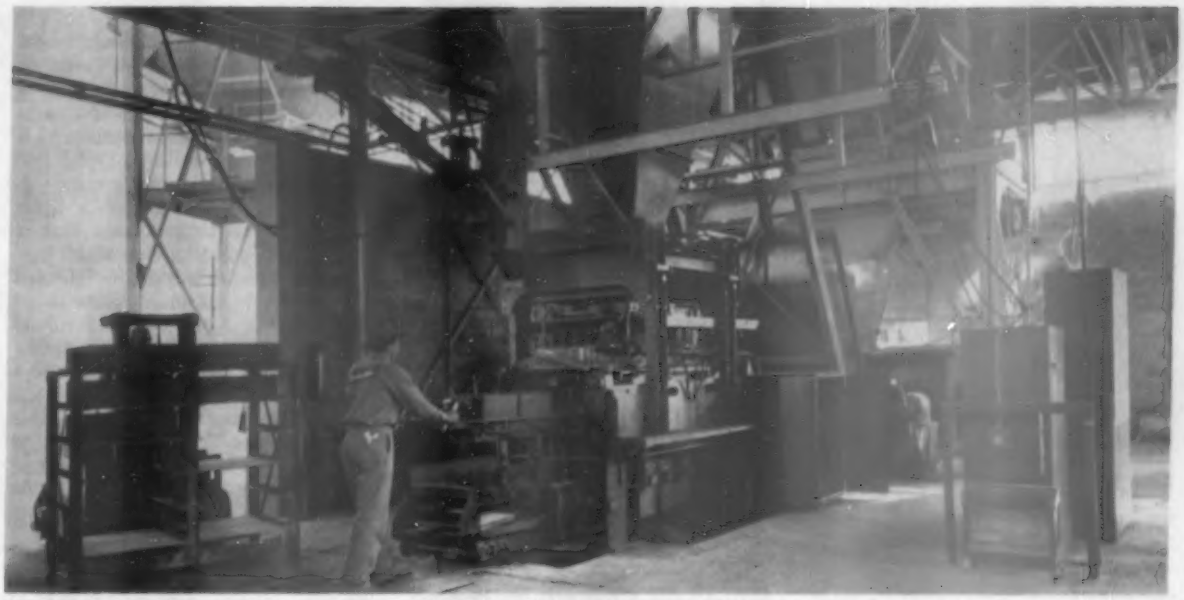
—all of Fort Lauderdale, except as otherwise noted

LONE STAR CEMENTS COVER THE ENTIRE CONSTRUCTION FIELD

LONE STAR CEMENT CORPORATION

Offices: ABILENE, TEX. • ALBANY, N. Y. • BETHLEHEM, PA. BIRMINGHAM • BOSTON • CHICAGO • DALLAS • HOUSTON INDIANAPOLIS • KANSAS CITY, MO. • NEW ORLEANS • NEW YORK NORFOLK • RICHMOND • WASHINGTON, D. C.

LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 18 MODERN MILLS, 141,600,000 SACKS ANNUAL CAPACITY



Block machine with a capacity of twenty-four 8- x 8- x 16-in. units per min., is served by 75-cu. yd. mixer equipped with a moisture meter. Note electric control panel, to the right

Ready-Mix Producer Now Making Autoclaved Concrete Block

• Jackson Ready-Mix Concrete, Jackson, Miss., also to make prestressed concrete products. Promotion includes radio, television, and newspaper advertising

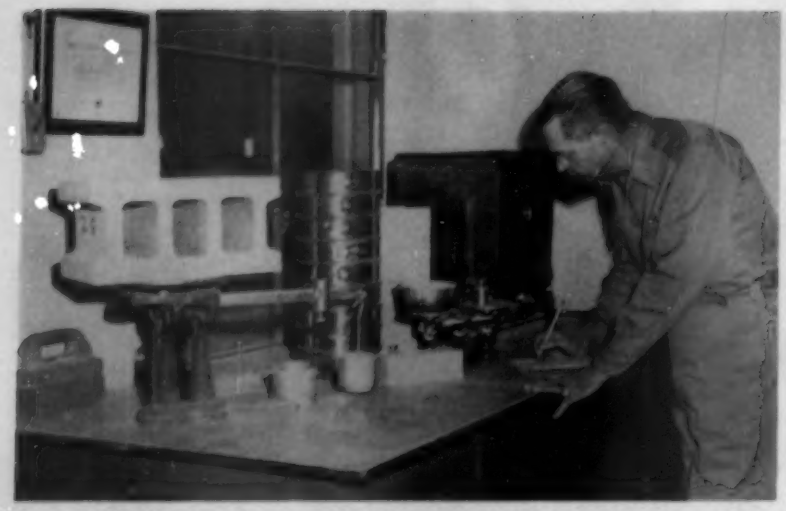
By HUBERT C. PERSONS

IN 1945, W. H. "BROCK" DAY saw Jackson, Miss., as one of the fastest growing cities in the South. He also saw a very definite need for a modern ready mixed concrete plant to serve this fast growing city. During the latter months of 1945, Jackson Ready-Mix Concrete was organized. A convenient and centrally located site was purchased, a modern plant erected, and the most modern truck mixers available were put into service. Jackson Ready-Mix Concrete then began operations in early 1946 based on a policy of quality, service, and good customer relations and each year since has enjoyed a sound and steady growth.

Plant Is A Show Place

Further evidence of Mr. Day's merchandising and public relations sense is evidenced by the fact that he has made the combined ready-mixed concrete and block plant a show place. Floors of all buildings, walkways, aprons, runways and drives are swept carefully each day when the machines are shut down in the late afternoon. All mixer trucks are washed and lined up in a neat row in the yards. After dark the entire plant is floodlighted. The batching tower for the block plant is surmounted by an attractive sign with

End view of autoclave showing fork lift truck with outrigger wheels for operation over track into cylinder with 72-block rack



Corner of laboratory, showing equipment for testing aggregates, sieve analysis, weighing apparatus, etc. Other equipment includes a compression testing machine and a laboratory size autoclave

the trade name "Jax-Lite" and a giant block outlined in lights. The night view of the plant presents such an attractive scene from the I. C. Overpass on Woodrow Wilson Drive, that Jackson residents often take visitors to see it. During the Christmas season the batching tower is topped by a large lighted Christmas tree which can be seen for miles.

Operate 30 Mixer Trucks

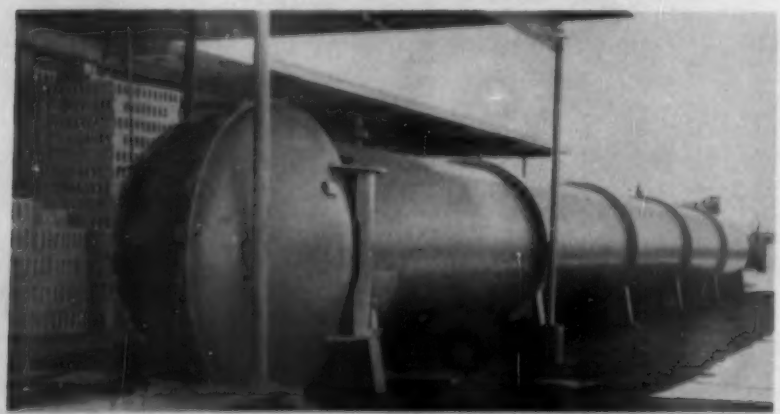
Thirty mixer trucks are now in operation. All are specially built International tandems, Model F210, with Smith mixers. Thornton No-Spin gears have been incorporated in each truck, providing eight-wheel drive. All the trucks are operated on butane gas.

The plant receives cement in bulk railroad cars. The cement is dumped into an under-track hopper and carried by screw conveyor to a bucket elevator which takes it to a 77-ft. high Butler batching tower with cement bins of six-car capacity. The tower also includes a four-compartment bin for aggregates.

Aggregates are also delivered by rail in hopper-bottom cars. From the track hopper the aggregates are stockpiled by a belt conveyor and fed into the mixers as needed. This plant has two 2-cu. yd. Ransome stationary type mixers. Batching is manually controlled.

In 1947 Plant No. 2 was erected in another part of the city to meet the growing demand for quality concrete and dependable service with modern equipment.

Similar facilities are operated at the No. 2 ready-mixed concrete plant in a different section of the city, except that the batching tower and bins are made by Blaw-Knox and the single mixer is a 2-cu. yd. Koehring. Here the overhead bins have five compartments, four for aggregate and one for cement. The fleet of 30 mixer trucks serves both ready-mixed concrete plants.



Installation view of 8- x 100-ft. autoclave which has since been covered with a 2-in. layer of block insulation over which a wire mesh and waterproofing has been placed

Masonry Products Division

When W. H. "Brock" Day, president of Jackson Ready-Mix Concrete, announced his intentions of adding a concrete block plant to his ready-mix business, friends tried to dissuade him. The Jackson, Miss., area, they told him, couldn't absorb any greater volume of block than was already being made. Mr. Day took a closer look at the market potential for block and went ahead with his plans. He felt that architects, engineers, contractors and the general public in and around Jackson, just hadn't been fully informed of the advantages of well-made concrete masonry units. He was sure that by making the best possible block and backing up an aggressive sales policy with modern methods of advertising and merchandising, Jackson Ready-Mix could create its own market for block.

The soundness of Mr. Day's decision is evidenced by the fact that the Masonry Products Division of Jackson Ready-Mix, launched in June, 1954, has recently stepped up production by installing a large autoclave for high pressure steam curing of concrete block. This is in addition to four large low pressure steam curing kilns. And in June, 1955, the new Prestressed Concrete Division will begin the manufacture of prestressed long span roof and bridge decks and other structural members.

The Masonry Products Division began making block in June, 1954. No block was shipped for the first month. It has since been a consistent policy that no block less than 28 days old can leave the plant except those cured by high pressure steam.

"It was felt that if we were to compete successfully in this market we must make block of the highest possible quality," Mr. Day said. "No units are manufactured except those meeting Underwriters' Label Specifications."

The plant produces 8- x 8- x 16-in. block in all standard shapes including "U" block and 8-in. and 16-in. lintel block. Half height block and split block are also made. All block are made with lightweight aggregate. Three types of lightweight aggregate are used: expanded slag made by the Woodstock Slag Corp. of Birmingham, Ala.; Enslite made by the Birmingham Slag Co.; and Haydite shipped from Louisiana.

Portland Cement is supplied by the Marquette Cement Mfg. Co. plant at Brandon, Miss. An air-entraining agent, is added at the mixer. According to Mr. Day this gives better workability to the concrete mixture and relieves the harshness due to lightweight aggregates.

The Gocorp King block machine with two mold boxes gives the block plant a capacity of twenty-four 8- x 8- x 16-in. equivalents per minute. This machine is served by a 75-cu. ft. Gocorp mixer equipped with a P & S moisture meter.

High Pressure Curing

Both low pressure and high pressure steam curing is used in the block plant. The recently installed 8- x 100-ft. autoclave, furnished by the Richmond Engineering Co., is equipped with a quick-opening type door made by the Ted Harris Door Co. Rails are installed in the autoclave so that a Clark fork lift truck with outrigger wheels can carry 72-block racks directly into the kiln. The autoclave accommodates 30 such racks, for a total of 2160 units per cycle.

High pressure steam curing equipment turns out block with 28-day strength in 12 hr., reduces shrinkage by 50 percent and makes a lighter colored block. It is planned to install two additional high pressure curing kilns to fit production needs.

Racks of molded concrete masonry units are placed in the autoclave, the door is closed with the vent valve left open, and steam is injected slowly. About 30 min. is allowed for the evacuation of air in the autoclave which is indicated by steam escape through the vent valve.

At this point, the vent valve is closed and after 30 min. (time required to bring the cylinder and its contents to 212 deg. F.) pressure begins to build up in the cylinder. Steam injection is so regulated that about 3½ hr. are required to bring the pressure to approximately 130 to 140 p.s.i.

This pressure is maintained for a period of 6 hr., and then the pressure is reduced through the bleed-off valve over a period not to exceed ½ hr. The vent valve and cylinder door are then opened to permit a draft through the cylinder.

Steam for the cylinder is furnished by a 150-hp. boiler having an operating pressure of 135 to 145 p.s.i.

The plant has four low pressure steam curing rooms, each 84 ft. long, 10 ft. wide and 8 ft. high with a combined capacity of 13,824 units. Metal insulated doors of these curing rooms were made by the Moore Dry Kiln Co. The maximum curing temperature is 180 deg. F. Steam is turned into the curing rooms gradually until that temperature is reached. It is kept on for 5 hr. and then turned off and the block allowed to soak overnight.

Steam for both the low pressure and high pressure curing is supplied by the 150-hp. high pressure, gas-fired Sellers Manufacturing Co. boiler. Because raw water is used it is preheated and given a water-softening treatment before entering the boiler.

Mobile equipment used in the block plant includes three 6000-lb. Clark fork lift trucks with side shifting devices.

Attractive exhibit of company's products at 1954 Mississippi State Fair

Material Handling System

Bulk cement is handled through a 400-bbl. Blaw-Knox bin. Aggregates are moved by a short belt conveyor and bucket elevator carrying materials to six-car capacity overhead storage bins.

A Gocorp cubing off-bearer has been installed recently in the concrete-paved cubing area. This operates on compressed air and speeds up the cubing of block for either storage or shipping.

No culls are accumulated in the block plant. All block which is substandard in any way is run through an American Pulverizer Co. hammermill, reduced to aggregate size and blended back into the concrete mixture.

The block plant, including the autoclave, was equipped at a cost of approximately $250,000. Low pressure steam cured block sell in the Jackson area for around 21 cents. The autoclave-cured units bring a premium price. Mr. Day says that customers feel a premium price is justified because the block are less subject to volume change due to moisture, are more uniform and true in shape and size.

Market Products Under Trade Names

Jackson Ready-Mix Concrete products are marketed under a family of trade names: Jax-Mix for ready-mixed concrete; Jax-Lite for concrete masonry units; Jax-Stone for split block and Jax-Dex for the prestressed bridge and roof deck units to be made starting in June.

A few concrete specialties are also made. These include water and feed troughs for the farm market: "Homeward" precast steps and platforms; splash block to meet FHA specifications, concrete house piers, lumber yard piers, lawn benches and tables, bird baths, sun dial pedestals and other special items.

Some of these specialties are dis-

Demonstration area adjoining office displays various products and masonry treatment

Judging 45 entries in the Mississippi concrete home design competition sponsored by company with the approval and cooperation of the Mississippi Chapter of the American Institute of Architects

played in a well-planned demonstration area adjoining the plant office building. Here are examples of a wide range of types of masonry, textures, finishes, and handling of mortar joints. The display includes block for a patio floor and several sections of attractive garden walls.

Need for Prestressing

The decision to set up a Prestressed Concrete Division resulted from an investigation over a period of years showing the need for prestressed concrete products in the Jackson area. Work will be started with four 450-ft. casting beds. Precast, prestressed structural sections designed by the Lakeland Engineering Co., Lakeland, Fla., will be manufactured under a special franchise arrangement. Mott L. Pevey, Jr., a graduate engineer, has been employed to direct prestressed manufacturing operations.

All truck service cars, cars of engineers, maintenance men and salesmen are equipped with a two-way radio leased from the Southern Bell Telephone Co. This has a useful range of 25 miles.

Preventive Maintenance

Although Mr. Day is a firm believer in the value of cleanliness and good housekeeping in a plant as a factor in preventive maintenance, he believes in departmentalizing maintenance operations and establishing definite lines of responsibility. Maintenance of ready-mix trucks and equipment is the responsibility of a man who actually performs the maintenance operations but who is under the supervision of W. L. Bonner, Jr., general superintendent of ready-mixed concrete operations. A daily and continuing check is maintained on all mechanical equipment. Written records are maintained on repairing, lubrication, tire changes, and anything required to keep vehicles in first class condition.

Block plant maintenance is under the supervision of C. E. Sills, block plant superintendent. Ready-mix design and field pouring operations are supervised by George Nichols, an engineer with 15 years' experience in concrete.

Dale Cobb is manager of the Concrete Products Division and in charge of sales and promotion.

Mr. Day is a firm believer in trade associations, and Jackson Ready-Mix Concrete is a member of the National Ready-Mix Concrete Association, National Concrete Masonry Association, American Concrete Institute, Autoclave Building Products Association, American Prestressed Institute, Southeastern Regional Masonry Association and other associations in affiliated fields.

Sell Through Dealers

Concrete masonry units and other concrete products of Jackson Ready-Mix are sold through building material dealers. A dealer gets credit for sales and deliveries in his area even though the customer may call at the plant for the items.

A consistent campaign of education on the advantages of Jax-Lite block is being conducted through regular mailings, newspaper and local magazine advertising, billboards, displays and a 5-min. television program on two local stations four times a week. Mailings are made once a month to architects, contractors, engineers and material dealers within a 100-mile radius of Jackson. Every two months a mailing is made to school officials, members of boards of education, Architects, contractors and designers interested in school construction. Inquiries resulting from the television time are followed up by mailings to the individuals making the inquiry and by reference to the dealer nearest the point of origin of the inquiry.

During 1954, the company participated in numerous home shows and housing demonstrations. It also cooperated with the Marquette Cement Mfg. Co. in showings of a motion picture film on the manufacture of Marquette cement and its delivery and use in the Jackson Ready-Mix plant.

Home Design Competition

The outstanding promotion activity of Jackson Ready-Mix Concrete in 1954 and 1955 is a Concrete Masonry Home Design Competition sanctioned by the Mississippi Chapter of the American Institute of Architects. Cash prize awards totaling $3100 have been paid. Announcement of the contest brought in 100 requests for information on concrete masonry. There were 44 designs submitted. Entrance was limited to architects, students of architecture or draftsmen employed or studying in Mississippi.

Charles H. Dean, A.I.A. of Jackson was competition adviser. Judges were John H. Pritchard, Tunica, Miss., Mrs. Ralph H. Hester, Floyd R. Kimbrough and Archie L. Falls, all of Jackson, and William R. Allen of Gulfport.

The competition was for a three-bedroom concrete masonry house, suitable for the average family with a modest income.

First prize was $1000, second prize $750, third prize $500, and fourth prize $250. There were also six honorable mentions bringing $100 each.

Awards were made March 22, 1955, at a dinner in Jackson attended by 112 people including all contestants and architects from all over the state. All were guests of Jackson Ready-Mix Concrete. The prize winning designs are being publicly exhibited in hotels, department stores and other gathering places and have stimulated a great deal of interest in concrete masonry.

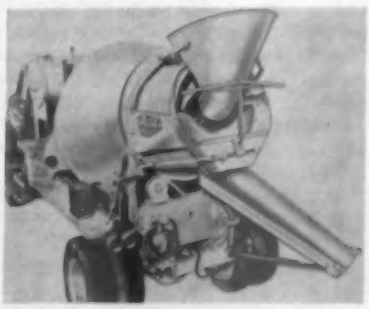
●

CALUMET READY MIX, INC., Calumet City, Ind., has begun operations. It is owned and operated by J. W. Newell and Sons, which has been operating in the Calumet region for over 50 years.

NEW MACHINERY

Curing Room Door Seal

UNIVERSAL DOOR CARRIER, INC., 1117 Cornell Ave., Indianapolis 2, Ind., has announced the Uni-Seal gasket and Uni-Seal rubber-to-steel cement, designed to seal curing room door openings. The gasket is of butyl rubber which is said to remain tough and resilient under kiln operating conditions, and will not harden, crack or get sticky and lifeless. The cement is a special compound developed to bind the rubber gasket to the steel kiln door. It is said to dry, tough, resilient and waterproof, and not become brittle, nor release at kiln temperatures, chip, break or peel. The door jambs and lintels must be prepared by grinding, wire brushing, or other abrasive action for proper adhesion of the cement.



Hydraulic Chute Controls

MONARCH ROAD MACHINERY CO., 1331 Michigan St., N. E., Grand Rapids 3, Mich., has introduced Dyna-Chute hydraulic controls to elevate the discharge chute on new or existing transit mixers. The controls operate through one lever, one man operated, and will raise, lower or hold one ton or more. Available for six or 12-volt systems, the controls combine pump, motor, valve, oil reservoir and solenoid in one unit. The hydraulic ram, flexible hose, fittings and a 15-ft. insulated battery cable are included for standard installations. When installed, there are no ratchets or pins to manipulate.

Plastic Concrete Coating

AMERICAN METASEAL CORP., West New York, N. J., has announced a plastic coating, consisting of a 100 percent polyester plastic with pigments added for color. It imparts a glossy, smooth, hard surface to such concrete surfaces as floors, swimming pools, and patios. It is said to be waterproof, peel-proof, chip and weather resistant. It needs no primer and spreads a coating twice as thick as conventional paint, eliminating the need for several coats. The coating hardens through chemical action, rather than through solvent evaporation, leaving about 85 percent of the coating on the surface. It is available in various colors including black, white, clear, powder blue, rose and yellow. Roller spreading is the recommended method of application.

Concrete Block Lift Truck

THE KNICKERBOCKER CO., Truckman Div., Jackson, Mich., has brought out the Model Y-40, 2-ton, high-lift truck for block plants, which is similar to the previous Model 40. It features a transmission with four speeds forward and reverse, up to 20 m.p.h. Six inches of free lift are provided to permit loading enclosed trucks or to shift racks in kilns. Power is supplied by a 40-hp., 4-cylinder, valve-in-head, Ford Industrial engine. The unit is available with either a wide or narrow axle, single or dual drive wheels and various style forks. A hydraulic side shifter is available as optional equipment. Standard lift is 108 in.

Mold Repair Table

BERGEN MACHINE & TOOL CO., INC., Nutley, N. J., has announced a mold repair table for 16- and 18-in. concrete molds. The mold is placed on angle supports, with T-handle clamping screws and latch pins holding the mold in position. The table is casterwheel mounted for movability to the desired workplace. Optional equipment includes two sets of shelves for tools and supplies.

Vibrating Table

CONCRETE MOLD & ENGINEERING CO., P. O. Box 183, Battle Creek, Mich., has introduced a heavy-duty, flat top vibrating table with a load bearing capacity of over 1000 lb. Table top dimensions are 8 ft. x 20 in. with standard heights of 18 and 28 in. The dimensions, however, may be varied to meet specific requirements. The vibration may also be adjusted to various degrees from mild to intense.

Lintel Machine

T. H. BALL AND SON, 850 Euclid Ave., Cleveland 14, Ohio, has announced Kent Lintelators for manufacturing lintels with block texture, up to 12 ft. 4 in. long. The machine can also produce a range of shorter lintels, as the end members of the molds are adjustable.

Storage yard showing part of the large stock of concrete pipe and block. Machine shop and garage are to the right

Large Texas Pipe Manufacturer Diversifies Operations

• Black-Brollier, Inc., Houston, Texas also is a large producer of concrete block, cast stone, and many concrete specialties. Makes its own Perlite aggregate

By HUBERT C. PERSONS*

ORGANIZED in 1936, to deal in building materials, Black-Brollier, Inc., Houston, Texas, is now operating a six-machine concrete pipe plant, one of the largest in the country; a modern concrete block plant, and a perlite processing plant as a subsidiary. These extensive operations are in addition to one of the largest and most complete building material yards in the Southwest. The vigorous expansion of this company in less than 20 years parallels the spectacular growth of the city of Houston in the same period.

New Pipe Plant

Although the company began making concrete pipe in 1941, the present plant was not put into full operation until the latter part of 1954. This entirely new and completely modern plant, officially designated as Plant No. 4, is located on a 25-acre tract of land, approximately six miles from downtown Houston. A network of freeways and expressways facilitates the trucking of pipe to any part of the city or to projects in all nearby towns without passing through the downtown section of Houston. According to George W. Black, president of the company, the new plant represents years of planning and research and studies of pipe plants in various parts of the country. Certain manufacturing techniques and curing procedures developed by Black-Brollier, are being applied in the new plant.

The six pipe machines and the sizes and types of pipe made by each are:

McCracken, Model R, making bell and spigot pipe in 3-ft. lengths, 4, 6, 8 and 10-in. dia.; bell and spigot and tongue and groove in 4-ft. lengths, 12-in. through 18-in. dia.

McCracken, Model H, making tongue and groove and bell and spigot pipe in 4-ft. lengths, 12-in. through 30-in. dia.

Quinn machine, making tongue and groove pipe in both 4-ft. and 6-ft. lengths in sizes from 24-in. through 72-in.

Universal, making tongue and

Large stockpile of aggregates over reclaiming belt conveyor in 240-ft. tunnel made of 84-in. concrete pipe. Cement storage and batching tower in the background

groove pipe in 4-ft. lengths in 30-in. through 60-in. sizes.

Martin machine making bell and spigot pipe in 3-ft. lengths, 4-in. and 6-in. sizes.

Champion drain tile machine making 4-in. and 6-in. tile in 1-ft. lengths.

The plant also makes wet cast and vibrated pipe in 30-in. through 48-in. sizes in 10-ft. lengths and 84-in. pipe in 4-ft. lengths.

There are five steam curing rooms for the smaller sizes of pipe. The larger sizes are usually water-cured but can be steamed when a faster curing cycle is desired.

The manufacturing building is 119- x 238 ft. A height of 31 ft. at the peak provides ample headroom for all operations. Broad concrete runways outside of the building have been provided on three sides to facilitate movement of trucks to and from the yards. The runway on the east side of the building is 139- x 50 ft. The concrete slab on the west side is 139- x 87 ft. and on the north side 238- x 50 ft.

Bins Over 240 ft. Tunnel

An unusual feature of the pipe plant is a tunnel, 240-ft. long beneath four aggregate bins at ground level. This tunnel is made by connecting sections of 84-in. concrete pipe cast in the plant. When the gates under the aggregate bins are opened, the aggregate falls onto an 18-in. belt conveyor which takes it to a bucket elevator and thence to one of the four aggregate bins in the 72-ft. high batching tower. Bin signals in the tunnel, consisting of colored lights, indicate to which tower bin the aggregate is to go. Green indicates an empty bin and red a full bin. The aggregate in four different sizes is delivered to the plant by railroad and unloaded into the ground level bins by clamshell.

The cement is also delivered to the plant in bulk cars. It is unloaded by a Butler electric car scoop into a screw conveyor which carries it to a bucket elevator. The cement is then lifted to a bin in the batching tower or routed automatically to a storage silo which holds two carloads of cement.

In the batching tower, the aggregates are weighed automatically, properly proportioned, mixed with the correct amount of cement and discharged onto a belt conveyor which delivers the dry mix to the mixer behind the designated pipe machine. The correct amount of water is added to the dry mix through a Venus meter at each machine.

Two wire cage rolls are operated to assemble and shape reinforcing for 4-ft. and 6-ft. length pipe. Steel in the reinforcing cages is cut with a pneumatic bolt cutter made by the K & R Equipment Co.

Looking down 240-ft. long reclaiming belt conveyor tunnel which is made from 84-in. concrete pipe manufactured by the company.

Handling equipment used in the storage yards and plant includes two Model 150 Hyster lift trucks of 15,000-lb. capacity; one Ross fork lift truck of 18,000-lb. capacity; three Clark fork lift trucks, 6000-lb. capacity, and four winch trucks.

The storage area and roadways are maintained with an Allis-Chalmers bulldozer and road maintainer.

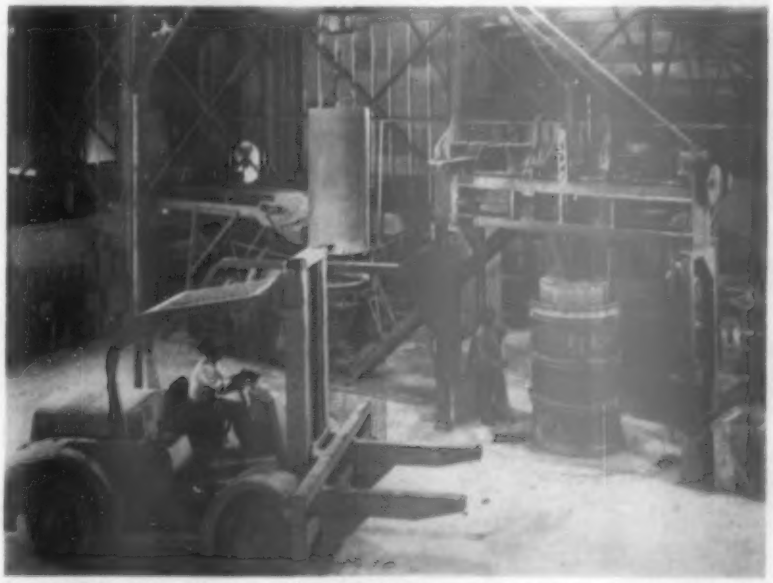
Test racks are provided at the plant to carry out hydrostatic and absorption tests as well as strength tests to meet A.S.T.M. and county, state and federal specifications for concrete pipe.

The pipe plant employs 86 men including truck drivers.

Block Plant Operation

The concrete block plant, known as Plant No. 3, occupies a 5-acre tract about four miles from downtown Houston. Job deliveries of block can be made in any direction without passing through the congested sections of the city.

The daily capacity of the plant at the beginning of 1955 with one Besser Super Vibrapac machine was about 9500 units in either the 8 x 8 x 16-in.



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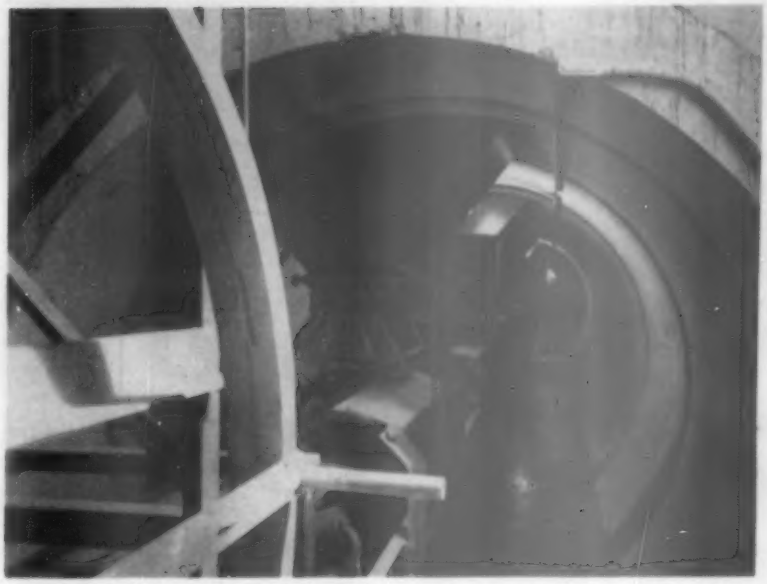

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In this section of the plant 30- to 60-in. tongue and groove pipe are made. A 3-ton lift truck handles forms and finished pipe

Tamper type pipe machine making tongue and groove and bell and spigot pipe in 4-ft. lengths, 12-in. to 72-in.

Interior view of plant which prepares perlite. Bags each contain 4 cu. ft. of Permalite, the trade name for Perlite of Houston, Inc. products

size or the 8 x 5 x 12-in. size. Air-entraining cement in paper bags is used. A 50-cu. ft. Besser mixer is located directly behind the block machine. An overhead skip-hoist carries the concrete mix to a hopper over the machine.

Lightweight block is produced using "Featherlite," an expanded aggregate from the Converse, Texas plant of the Featherlite Corp., Austin, Texas.

A second block machine, recently added, is a Bergen Trimatic machine with height and density control and a front pallet return. This type of height and density control and front pallet return also has been added to the Besser Super Vibrapac machine.

Bulk cement is received in box cars as hopper cars are not available, and a Fuller-Kinyon unloader pumps cement pneumatically through pipes to the cement silo located 200 ft. from the unloading point. Another addition is a new aggregate batching plant, including bulk cement storage, supplied by Dillon Steel Co. Aggregates are unloaded from the gondola cars with a Link-Belt clamshell and elevated directly to the batching plant bins.

In addition to all sizes of block, the No. 3 plant also has begun making facing stone, sold under the trade name "Desertone." Limestone aggregate is used with fade-proof colors. This specialty is being made in slabs 2¼- x 7⅝- x 15⅝-in. split with a Bes-Stone splitter.

The plant also makes concrete manhole cones and manhole sections in 1-ft., 1½-ft. and 3-ft. lengths; septic tanks in 200, 300 and 500 gal. capacities; 12-in., 15-in., and 18-in. grease traps and concrete stock watering troughs. Pipe line markers are also being made as a specialty for a major oil company.

The block plant employs an average of 47 men including truck drivers. All block, cast stone and other products are handled with six Towmotor and two Clark lift trucks.

Material Yards

The building material plant comprises a large yard and warehouses served by two railroad sidings. This is known as Plant No. 1. It is situated about three miles from the downtown section. A large stock of building materials is maintained. The stock includes plaster, metal lath and accessories, refractories, portland and masonry cement, masonry paints, vitrified clay pipe in all sizes, waterproofing agents, asphalt products, Sonotubes, corrugated and flat sheet asbestos, steel and aluminum windows, Blok-Mesh, face and common

(Continued on page 224)

Prestressed Concrete Institute Holds First Annual Meeting In Florida

• Plan to set up specifications for prestressed concrete and undertake series of tests and research projects to improve design and quality of products

INTENSE INTEREST in prestressed concrete was indicated by the large attendance at the first annual convention of the Prestressed Concrete Institute in Ft. Lauderdale, Fla., April 21-22. Tremendous developments are impending in this field. Exactly 339 engineers, architects, contractors and concrete products manufacturers from many states, Cuba and even Australia, attended the sessions. A maximum attendance of 100 had been expected.

"The large attendance at the Ft. Lauderdale meeting shows that concrete technicians all over the country are beginning to recognize the potentialities of prestressed concrete," said H. H. Edwards, president of Lakeland Engineering Associates, and one of the organizers of the Institute.

The Institute was launched in Tampa, Fla., April 8, 1954 with seven charter members. Douglas Cone, first president of the Institute, explained its purposes in a welcoming address at the Lago Mar Hotel. "At the outset of the development of prestressed concrete in the United States," Mr. Cone said, "the crying need was for national standard specifications for the design and manufacture of prestressed concrete products. In view of the fact that these specifications were not forthcoming from any of the national code writing agencies and since it was necessary that some suitable code be adopted, the Institute made this its first project."

The speaker explained that a set of standard specifications was adopted by the Institute in June, 1954. "Since that time," Mr. Cone said, "the Institute has sponsored a series of tests and research projects to improve the quality of production as well as design. Probably one of the most important of its functions has been the exchange of information, ideas and methods between the engineers and manufacturers, and the necessity for the continuance of this exchange cannot be too highly emphasized. The Institute plans to continue and enlarge its work in the coming year to include the publication of a technical journal for distribution to its members and the engineering profession and to engage in further research, both on its own and in conjunction with other national organizations, such as the Portland Cement Association, universities and nationally recognized laboratories." Mr. Cone is secretary and treasurer of Florida Prestressed Concrete Co., Inc. of Tampa.

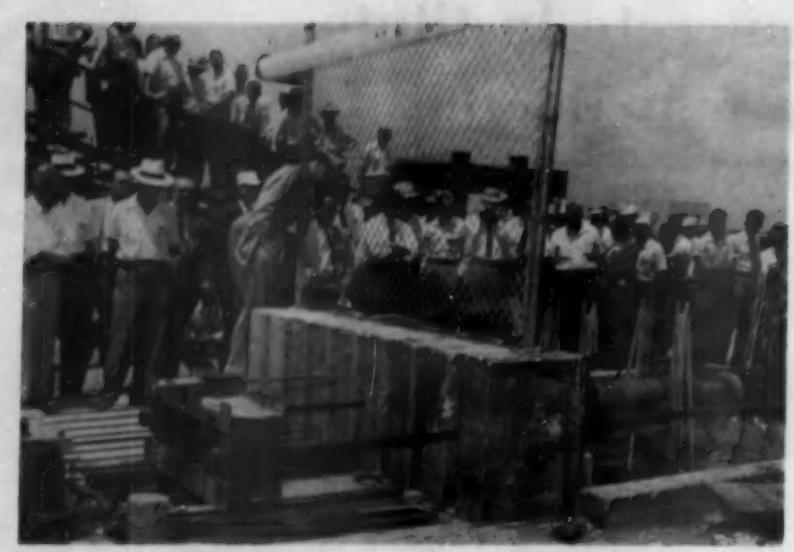
Trend to Prestressing

F. S. Burtch, sales manager of John A. Roebling's Sons Corp., Trenton, N. J., followed Mr. Cone with a paper on "The Trend Toward Prestressing." He said there is a decided trend toward prestressed concrete in the United States and all the evidence points to a bright future. After sketching the history of prestressed concrete in the United States, Mr. Burtch presented project data indicating that the strongest trend in prestressing favors the pretensioning method. The speaker pointed out that there has been spectacular growth in the application of all types of prestressing in the past few years and that the greatest potential at present is in linear structures rather than circular, such as tanks and pipe.

"Pretensioning took a bow in the United States in December, of 1951," Mr. Burtch said, "when a 24-ft. span, consisting of rectangular beams laid side by side to form a 22-ft. roadway was erected near Hershey, Penn. Since that date the Pennsylvania Department of Highways has built in the neighborhood of 200 bridges of this type, ranging in clear span lengths from 12 to 50 ft.

"The next three years saw many notable milestones along the march of the prestressed idea. Among them are San Francisco's Barrett-Lick Garage with its mammoth girders stressed up to 2380 tons compression, the Sunshine Skyway over Lower Tampa Bay, the Port of New York Authority's Pier 57 and its 200,000 sq. ft. Pier C at Hoboken, N. J., the Garrison Dam spillway bridge and New Jersey's Garden State Parkway overpass bridges. It is of interest to note that our friends in Cuba are in the parade with the distinction of having built, among other structures, four hollow box prestressed bridges ranging up to 295-ft. clear span lengths. Their latest bridge is believed to be the longest single-

Four 430-ft. long casting beds for large channel slabs or deep beams, and also two 100-ft. casting beds at the R. H. Wright & Son, Inc., plant near Ft. Lauderdale, Fla.



Apparatus for applying tension to steel reinforcing

span prestressed concrete structure in the Western Hemisphere.

"And now we are witnessing the construction of new projects such as the bridge tunnel crossing at Hampton Roads, the second Tampa Bay Crossing, the 24-mile bridge over Lake Pontchartrain, a third large pier at Hoboken and many industrial buildings and lesser projects from coast to coast.

"It is interesting to examine more closely the nature of the prestressed structures completed to date. The earliest ones, excepting the Pennsylvania Highway Bridges and Pier 57, utilized one or another of the several variations of the post-tensioning method that are in general use. Selection of a specific method was presumably influenced by design requirements, cost factors and engineering judgment—all valid reasons.

"In 1952 and 1953 pre-tensioning operations were started in Colorado and in Florida and research programs were initiated to develop bond data. A year or so later a satisfactory pattern of bonding characteristics for tensioning elements, up to ⅜-in. diameter, was fairly well established, and from that time designers and fabricators not only looked on pretensioning but supplemented their judgment by increasing activities in its promotion. The trend toward pretensioning is evident in the more recent structures built and projected.

"This development, following the advent of the pre-tensioning idea as practiced in this country, has probably contributed to the impetus of the prestressed story here more than any other factor. Most prestressing methods, including pre-tensioning, had their origin in Europe. When introduced here, seven-wire, high strength strands were utilized in place of single wires. This practice improved the bonding properties of the tensioning elements. Then seven-wire stress-relieved strand was introduced and the combination of higher initial stresses, now possible with the still better bonding properties of the stress-relieved strand, led to the use of fewer and somewhat larger strands. The overall result was a material reduction in fabricating costs for the pre-tensioning method.

"Items commonly produced by this method consist mostly of bridge girders, pier decks, piling and lighter members used principally in buildings. Decks, such as roofs for carrying light loads, are generally made of channel sections, tee sections or double tee sections. Roof beams and girders are normally I-section design.

"It can be seen that in less than five years prestressed concrete has grown from nothing to a building material that must be reckoned with. From a trickle, to around 3,500,000 sq. ft. of bridges and perhaps 8,000,000 sq. ft. of buildings of various types during 1955, is roughly the record, and the figures are necessarily very approximate. This represents a growth of from 200 to 300 percent per year and the reason is simple. Experience has shown that prestressed concrete is permanent, its appearance is pleasing, and it is economical to build and to maintain.

"Another approximation is that two-thirds of the prestressed bridges and three-quarters of the prestressed buildings currently in progress are of the pretensioned bonded type. For that too, there is a simple explanation—lower costs and the closer control of quality that is afforded by central plant production. The prestressing costs, including the stressing elements, of members to 60-ft. in length and produced in quantity, is about half that for the post-tensioning method best suited to the job. Lengths from 50 to 70 ft. may show a cost advantage utilizing a combination of the two methods. Longer spans of prestressed concrete as well as isolated structures not justifying the initial cost of a fabricating plant, necessarily utilized the post-tensioned method.

"Many improvements in design and fabricating techniques have been developed since the early structures less than five years ago and without question many of those structures could be built today at a considerably lower cost. In this infant industry it seems reasonable to expect further progress in this direction as a part of normal growth. Many of our leading firms of consulting engineers and architects and our state highway departments are using prestressed concrete in their designs. Our technical schools are including it in their curricula and many of them are doing special research on various aspects of design.

"Our contractors, large and small, are becoming familiar with prestressing methods and costs. Fabricators throughout the country are getting

(Continued on page 215)

Load test on 60-ft. prestressed concrete channel

Before You Buy Any Truck Mixer, We Want You to Make This Comparison Check

Does the Truck Mixer You Want Have:

	REX ADJUSTA-WATE	MIXER "A"	MIXER "B"	MIXER "C"	MIXER "D"	MIXER "E"
Engine in rear for best weight distribution	✓	✓				✓
Complete engine accessibility	✓					
Flexibility in choice of truck	✓					
Flexibility in mounting	✓					
Choice of transmissions	✓		✓	✓		
Maximum maneuverability	✓		✓	✓	✓	✓
Choice of water systems	✓		✓	✓	✓	✓
Choice of water tanks	✓		✓	✓	✓	✓
Choice of charging system	✓		✓	✓	✓	✓
Choice of discharge	✓		✓	✓	✓	✓
Electronic-tested frame	✓					
Chain drum drive	✓		✓	✓	✓	✓
Bolted-on mixing blades	✓		✓			
Recirculating mixing blade	✓					
Finger-tip discharge control	✓					
Automatic throttle control		✓				
Fast, complete discharge		✓				
Maximum discharge range because no interference from truck tires		✓		✓	✓	✓
Low angle of drum inclination for fast, thorough mixing		✓	✓	✓		✓
Fast, thorough water distribution		✓		✓		✓
Manten steel drum shell		✓				
Ball-and-socket design, front drum bearing		✓				
Flame-hardened, drop-forged drum rollers		✓				
Rugged drum track, free from deflection under load		✓			✓	
Leakproof water valve		✓				✓
High capacity Pump		✓				

use this handy check chart

If you're considering a truck mixer that doesn't have all these features, you can't expect long, economical service . . . profitable operation . . . and it will not offer you a selection to fit your operating and cost requirements. Your Rex Distributor will be happy to explain why!

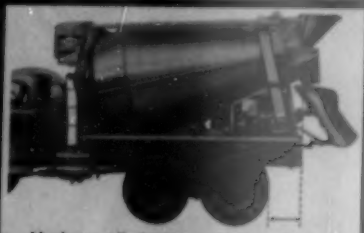
Only REX® Adjusta-Wate Gives You All These Advantages . . .

Before You Buy Any Truck Mixer . . . Check These

Exclusive design — REX Adjusta-Wate Moto-Mixers are designed with the engine in the rear. This engine arrangement permits the load center of gravity to be nearer the front axle for better weight distribution, greater pay loads. And the Adjusta-Wate allows the greatest choice in truck selection . . . you pick the wheel base and power that best fit your needs.

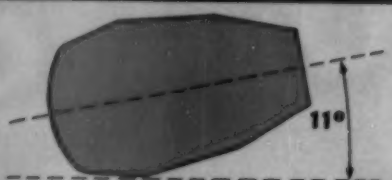
Maximum maneuverability — Rear-mounted engine shortens center of gravity . . . allows mounting on shorter wheel base trucks. A decided advantage for fast maneuvering in tight quarters.

Choice of water entry systems — REX 202 Front Entry system distributes water quickly and uniformly throughout the batch . . . ideal for all types of hoppers. For fixed hoppers, the REX 101 Rear Entry system is perfect for tempering and flushing purposes.



Maximum discharge range — The Adjusta-Wate can be mounted on the truck with proper load distribution and yet place the discharge point far enough behind the rear tires to facilitate maximum spotting range.

Fast, complete discharge — Excellent blade action and wide range of spouting equipment give the REX Adjusta-Wate Moto-Mixers unexcelled discharge speed.



Lowest drum angle — Special design of the drum, blade and low incline of the drum produces an exceptionally fast, thorough and uniform mix. Mixing action is unmatched by any other inclined-axis drum mixer.

Reciprocating mixing blades — Another REX exclusive! Blades have a reverse pitch that propels mix in the opposite direction, producing a real end-to-end mixing action every drum revolution.

Choice of charge and discharge systems — To give you the widest range of operating functions, Adjusta-Wate Moto-Mixers offer these charging and discharging systems.

Open-end hopper

Sealed hopper

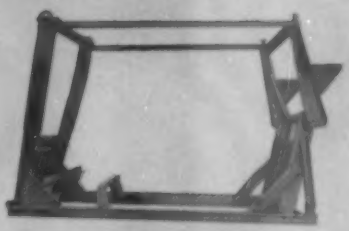
Flat door

Top charging hatch

REX

Adjusta-Wate Moto-Mixers are made

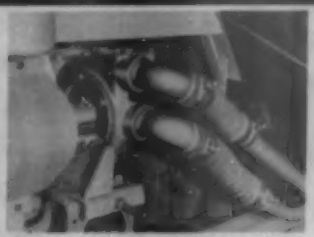
REX Operating and Mechanical Advantages . . .



Electronic-tested frame — Special high tensile steels electronically strain tested make possible this extra-strong, light-weight frame. No excess weight to limit your pay load.

Chain drum drive — Originated by REX, the chain drive is the accepted standard for truck mixers. It provides smooth operation with full shock protection to vital drive parts.

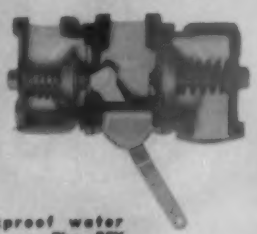
Bolted-on mixing blades — Exclusive blade design produces unequaled mixing action and fast discharge. Segmented blades bolt on for ease of replacement.



High-capacity pump — A 1½" 60-gals.-per-minute pump delivers water to the drum quickly and efficiently. Electro-magnetic clutch operates pump from push button in truck cab and at rear of mixer.

Front drum bearings — Self-aligning ball-and-socket design with anti-friction tapered roller bearings assures free-rolling drum under all operating conditions.

Drop-forged drum rollers — Flame-hardened and drop-forged for extra strength, these rollers never sprawl or chip. Anti-friction tapered roller bearings insure smooth operation.



Leakproof water valve — The REX Water Valve is simple in construction and extremely trouble-free. Rubber valves are easily replaced to restore new valve efficiency.

Automatic throttle control

Finger-tip discharge control

Finger-tip discharge control — Permits perfect control of speed of drum rotation to meter discharge from a trickle to full flow. Automatic throttle control protects engine and transmission from "shock" loads.

Manten steel drum shell — Made of thick, wear-resistant Manten steel for long, trouble-free service. Seams are lap-welded for maximum strength.

Rugged drum truck — Drum truck is of high-strength steel and precision made to give long, smooth operation, free of load deflection.

Choice of transmissions — The REX 202 has twin clutches running-in-oil that require no shifting . . . one lever engages clutch for mixing and discharging. Or, you may wish the rugged REX 101 Forward and Reversing Gear-Shift Transmission.

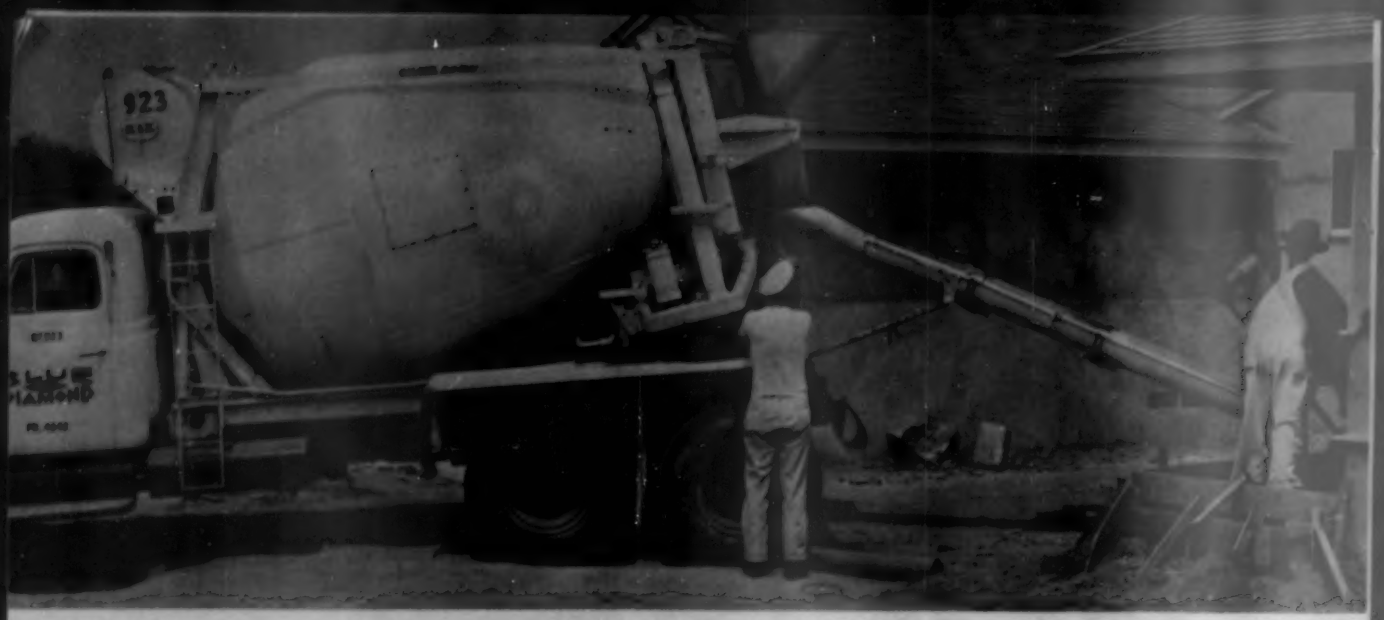
Choice of water tanks — Three water tanks are available for REX Adjusta-Wate Mate-Mixers to best fit your particular needs.

Rex 101 flush tank

Rex 202 two-compartment syphon tank

Rex 101 two-compartment sight gauge tank

in 3½, 4½, 5½, 6½ and 7½ yard sizes



To Serve the Needs of Western Operators The Cal-Rex Adjusta-Wate

To more efficiently serve the needs of western Ready-Mix operators, the Los Angeles Plant of Chain Belt Company offers the Cal-Rex Adjusta-Wate Moto-Mixer.

This efficient mixer incorporates all the exclusive Adjusta-Wate features that add up to more trips per day and per season . . . more profit for you . . . better quality concrete for your customers.

REX Horizontal and Adjusta-Hite Moto-Mixers

Built to the same top-quality standards as the Adjusta-Wate Moto-Mixers, these efficient, dependable machines assure unequaled performance. The Adjusta-Hite combines the advantages of a horizontal truck mixer with the high-discharge point of a high-discharge machine. Exclusive Rex Hydraulic System elevates the mixer body to the desired discharge position. It's a horizontal . . . it's a high-discharge . . . it's any point in between.

For the complete cost-saving story on the Rex Moto-Mixer line, see your Rex Distributor or write CHAIN Belt Company, 4695 W. Greenfield Ave., Milwaukee 1, Wis. There is a Rex Distributor in:

Albany, N. Y. • Albuquerque, N. M. • Alexandria, Virginia • Atlanta, Ga. • Augusta, Ga. • Baltimore, Md. • Barre, Vt. • Beltsville, Md. • Billings, Mont. • Binghamton, N. Y. • Birmingham, Ala. • Boise, Ida. • Buffalo, N. Y. • Butte, Mont. • Casper, Wyo. • Cedar Rapids, Iowa • Center-Green Island, N. Y. • Charleston, S. C. • Charleston, W. Va. • Chattanooga, Tenn. • Cheyenne, Wyo. • Chicago, Ill. • Cincinnati, Ohio • Clarksburg, W. Va. Cleveland, Ohio • Columbia, S. C. • Columbus, Ohio • Concord, N. H. • Dallas, Tex. • Davenport, Iowa • Denver, Colo. • Des Moines, Iowa • Detroit, Mich. • Duluth, Minn. • El Paso, Tex. • Eugene, Ore. • Fairport, N. Y. • Fort Wayne, Ind. • Grand Rapids, Mich. • Great Falls, Mont. • Greensboro, N. C. • Greenville, S. C. • Harrisburg, Pa. • Hartford, Conn. • Hibbing, Minn. • Houston, Tex. • Indianapolis, Ind. • Iron Mountain, Mich. • Jacksonville, Fla. • Jamaica, N. Y. • Kansas City, Mo. • Knoxville, Tenn. • Lexington, Ky. • Little Rock, Ark. • Longview, Tex. • Los Angeles, Cal. • Lubbock, Tex. • Luckey, Ohio • Macon, Ga. • Melrose Park, Ill. • Memphis, Tenn. • Miami, Fla. • Milwaukee, Wis. • Minneapolis, Minn. • Nashville, Tenn. Newark, N. J. • New Orleans, La. • New Philadelphia, Pa. • Newton Highlands, Mass. • New York, N. Y. • Norwalk, Conn. • Oklahoma City, Okla. • Omaha, Neb. • Owensboro, Ky. • Paducah, Ky. • Philadelphia, Pa. • Phoenix, Ariz. • Pittsburgh, Pa. • Pocatello, Ida. • Portland, Ore. • Reno, Nev. • Richmond, Va. • Roanoke, Va. • Rockford, Ill. • St. Louis, Mo. • Salt Lake City, Utah • San Antonio, Tex. • San Francisco, Cal. • Seattle, Wash. • Shreveport, La. • Sioux Falls, So. Dak. • So. Portland, Me. • Spokane, Wash. • Springfield, Ill. • Syracuse, N. Y. • Tampa, Fla. • Washington, D. C. • West Palm Beach, Fla.

CHAIN BELT REX COMPANY **CHAIN BELT COMPANY**

Litho in U.S.A. — M. P.

interested in its possibilities. More than 50 such fabricators are producing pre-tensioned bonded members with facilities built during the past two years. Some operate four or five casting beds producing various structural members, and others even more for special projects such as the Lake Pontchartrain Bridge. The last count revealed eight fabricators in the state of Florida but that is not to be taken as a permanent situation.

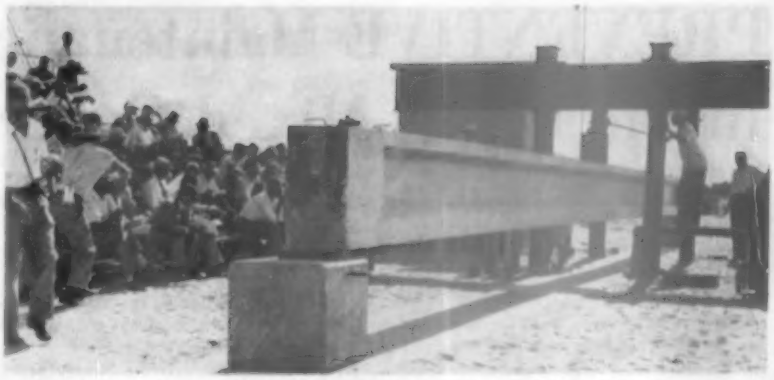
"The potential for new construction, exclusive of highways, may be expected to continue at current levels or to improve moderately. A population increase of nearly three million persons per year intensifies the need for new schools, hospitals and other classes of buildings. Industrial building is showing signs of a revival and the continued population shift to suburban areas, creates new demands for shopping centers and warehouses, all of which lend themselves to prestressed concrete design. The need for new highways is as critical as that of schools. New construction in this field should offer unusual possibilities for prestressed concrete now and in the immediate future."

Visit Large Pretensioning Plant

A bus trip to the 43-acre pretensioning plant of R. H. Wright & Son, Inc. occupied the remainder of the first day of the meeting. Here the visitors witnessed a series of full scale tests and field demonstrations. A barbecue lunch was served in the casting yard. The Wright plant is said to be the largest central casting prestressed concrete plant in the country. It is located near Pompano, eight miles north of Ft. Lauderdale.

The Wright plant has four 430-ft. long double-tee casting beds for large channel slabs or deep beams, and two 100-ft. beds. Steam curing pipes run through the beds carrying steam at atmospheric pressure for a 12-hr. curing cycle, when 4000 to 5000 p.s.i. concrete is obtained. The plant has been in production since June, 1954, and during that period has produced 275,000 sq. ft. of tee roof and floor slabs and 30,000 lin. ft. of 18 x 18-in. bridge piling. The plant makes tee beams up to 60-ft. long.

Plant equipment includes two mobile 20-ton Lorain Model 414 cranes; two Rodgers 200-ton hydraulic jacks with 48-in. ram for tensioning and two 200-ton Rodgers hydraulic pumps with lines running underground to all casting beds. There is also a 300,000-lb. Baldwin-Tate-Emery compression machine and a plant-designed 250,000-lb. testing rig for center loading and shear tests. The plant laboratory has all equipment for carrying out standard A.S.T.M. tests, including the Los Angeles abrasion test.



Subjecting 60-ft. prestressed I-beam to compression test

The Wright company also has a smaller plant on a 12-acre site at Dania between Hollywood and Ft. Lauderdale.

Tests conducted for the visitors included a concentrated load test of a prestressed concrete composite beam, 19-ft. 11-in. long; uniform load tests on a 60-ft. prestressed concrete channel; load test on a 60-ft. long prestressed concrete I-beam and load tests on 10-ft. prestressed concrete columns. All units tested were designed by Lakeland Engineering Associates

The composite beam which was designed for 25,300 p.s.i., showed the first crack at 35,000 p.s.i. At 49,000 p.s.i., deflection measured 154/64-in. and there were cracks in both top and bottom chords. When the load was removed, the beam immediately recovered, the deflection on recovery being 21/64-in.

The 10-ft. reinforced concrete columns designed for a 16.8-ton load, sustained a 50-ton load with only a slight deflection.

The 60-ft. prestressed concrete channel designed for a load of 38.4 p.s.f. showed the first crack with a .50-in. deflection at a load of 94.0 p.s.f. After sustaining a load of 124.0 p.s.f. with a deflection of 1.15-in. the member made a 92 percent recovery.

Research In the West

A paper was given by T. Y. Lin, associate professor of civil engineering, University of California on "Application and Research in Prestressed Concrete in Western United States." Dr. Lin said that prestressed concrete developments in the West were quite similar to the progress made in other parts of the country. In 1953, he said that designers began to find prestressed concrete more economical than ordinary reinforced concrete for some kinds of work. He said the basic economy is in the use of high tensile strength steel. He pointed out that prestressed concrete, on the basis of strength, is more economical than other material.

More research has been applied to prestressed concrete than to any other structural material, considering the relatively short time prestressed concrete has been used, Dr. Lin said.

Dr. Lin showed a series of slides of various projects and processes involving prestressed concrete. These included the Arroyo Seco bridge in Los Angeles, a garage in San Francisco where a 100-ton load is carried on prestressed girders and a number of projects on the West Coast. He concluded his talk by exhibiting a motion picture film showing the handling of reinforcing wire and the placing and finishing of prestressed concrete in forms.

Ross Bryan, consulting engineer of Nashville, Tenn., a pioneer in early developments of prestressed concrete, discussed prestressed multi-element units and pretensioned and prestressed poured units. Describing early work with small structural members, Mr. Bryan said: "Our main purpose was to determine where the economical advantages lie—between pretensioned block members and cast-in-place. We have found it difficult for poured units to compete with block units made by machine."

Slide pictures exhibited by Mr. Bryan showed 1000-ft. long casting beds in the plant of the Nashville Breeko Block Co.; a St. Paul, Minn. plant with 50-ft. block girders where hot water is used for curing; the first type of multi-unit bridge beams; and an 87-ft. x 42-in. girder cast in the T. L. Herbert & Sons plant in Nashville.

"High Strength Steel for Prestressed Concrete," was the subject of the third paper by W. O. Everling, director of research, American Steel & Wire Division, United States Steel Corporation. Mr. Everling used slide films showing how prestressed concrete can deflect without harmful effects because of high strength steel. He showed

(Continued on page 226)

PREVENTIVE Maintenance In the Ready-Mixed Concrete Industry

By JAS. A. NICHOLSON*

32: A producer views the ready-mixed concrete business. This article of series is on truck maintenance

THE EFFICIENT READY-MIXED CONCRETE OPERATOR puts on the road properly serviced trucks that are built to handle the largest possible legal payloads; trucks that are manned by safety-minded, competent drivers.

An individual operator, who effectively handles cleaning, greasing and tire-care, should have a good maintenance cost record, together with minimum road-call expense. An operator further assures a functioning preventive maintenance program by buying the right kind of trucks and mixers, employing careful, well trained drivers, demanding regular reports on the condition of equipment, requiring trucks and mixers to be inspected and serviced at proper intervals, making major repairs and overhauls during slack periods and above everything else, having trucks ready to run when needed.

A producer should use great care in selecting trucking equipment. Mixer trucks face tough stop-and-go driving conditions. Our trucks must have good clutches, transmissions, differentials and brakes. Engines on both trucks and mixers are exposed to serious idling problems. Valves are given rough treatment. To effectively resist sludge formation, oil requirements, carburetor performance, fuel pump efficiency and thermostat selection must be given special consideration. Mixer trucks carry heavy, shifting, live loads. Trucks must be powered with engines having "plenty of guts" for rugged off-the-road pulling, yet have the "go" for sufficient speed on the highway. Trucks must be built to give the best possible traction—at the same time, providing ease of steering. Truck frames must be thoroughly reinforced. Off-the-road hauling gives a real beating to clutches, transmissions, differentials, axles and tires. This equipment must be completely adequate. On tandem trucks, both axles must drive—there is no place in our industry for a dead axle on a tandem. G.V.W. (Gross Vehicle Weight) ratings have been, and are, most helpful in lumping together the qualities that one is looking for in a truck. Finally, trucks shouldn't be so heavy that they can't haul decent size loads legally.

In order to more intelligently select new trucking equipment, a producer should know the performance records of makes and models that are in his present fleet. He should seek the answers to such questions as: Are trucks of the right size? Do truck engines possess the necessary "stuff" (torque and horsepower)? Can engines be overhauled, rebuilt and replaced at reasonable cost? Are we getting good gas and oil consumption? Do our trucks have the proper wheelbase? Do trucks have the correct gear reduction? Are truck frames properly reinforced? Do our trucks have the right kind of tandem drive? Are we troubled with axle breaking? Are replacement parts costs running unduly high? Are tires giving good performance? If a mixer truck isn't doing a good job, a producer should know the reasons why.

If some comparatively new trucks, of certain makes and sizes, are unexplainedly showing high parts costs and excessive downtime expense, further purchases of such equipment should be avoided. Reports, along this line, indicate that more rugged and durable trucking units are required to handle our industry's tough hauling jobs. Such information shows a producer that he can afford to pay a higher original price for better performing trucks. Increased depreciation will be more than off-set by lower operating and maintenance expense.

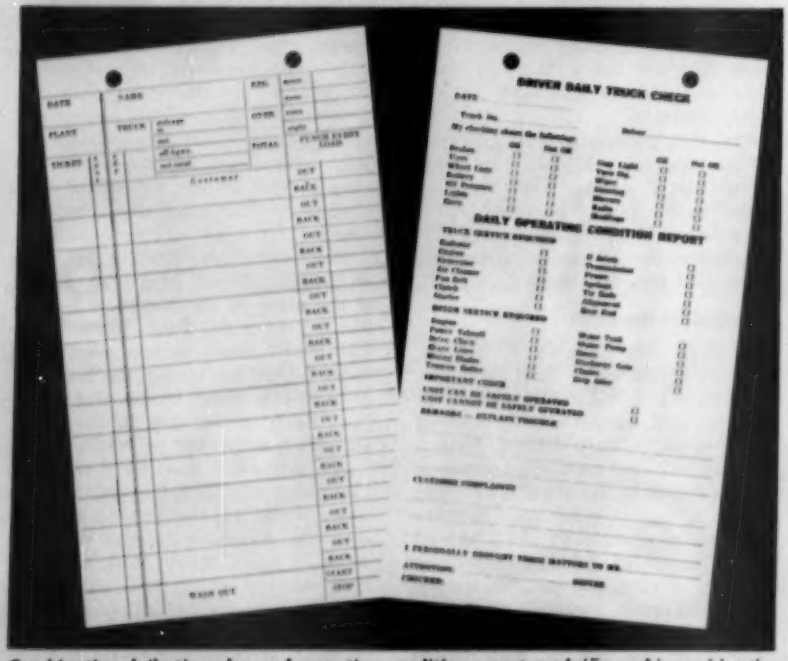
In buying new trucks, it is good thinking to keep in mind an observation, pointed out by Bob Shiely, in one of his studies on equipment: "By the end of 9000 operating hours, there can be as much as $4000 overall cost difference between too light a truck and a unit of the correct size."

Karel Somol, service engineer of the T. L. Smith Co., says there are three principal requirements of a mixer truck:

"1. Power and maneuverability to take the loaded truck in.
2. Speed to quickly return to the ready-mixed concrete plant.
3. Frame, axles, springs, wheels and tires adequate to carry the load."

In efficiently serving a customer on

*Pres., Nicholson Concrete Co., Toledo, Ohio



Combination daily time, log and operating condition report card (Form A) used by the Nicholson Concrete Co. To the left is the front side and to the right is the back side

the job, it is all important that the mixer truck has the power to take the load to different points of discharge; sometimes under very difficult conditions. Maneuverability and traction of the truck, together with driver competency are also important requirements. For maneuverability performance, the unit should have the shortest possible wheelbase, the shortest turning range and steering ease. For traction, the load must be properly placed on the truck and the unit equipped with the right kind of tires.

In an all-out effort to haul maximum legal payloads, larger tandem trucks are purchased, the engine is moved forward, the front wheels are positioned slightly to the rear, a space-saver cab or cab-over-engine is used, mixer mounting is changed with more weight put on the front axle, an 11,000-lb. or 14,000-lb. capacity front axle is used, larger tires of greater carrying capacity are placed on the front wheels and power steering is added. With some or all of these changes, bigger payloads are possible —actually and legally.

These changes, made at considerable cost, do not always add up to greater maneuverability or improved traction. In some cases, the added power of the bigger trucks is largely wasted. Too much weight has been thrown up front, steering becomes a difficult problem and slipping replaces traction. The higher powered, bigger payload trucks get "hung up" in spite of the competency of the drivers.

If regular trucking equipment is getting "hung up" on jobs where ground conditions are not too rugged, you should ask such questions as: Is the driver primarily responsible? Does he know how to operate the truck in tough off-the-road pulling? Has he been riding the clutch? Is the truck being operated in the wrong gear ratio? Is the governor set properly? Is the truck engine of sufficient size? Is the mixer correctly positioned on the truck? Is the front end digging-in? Is hard steering the real trouble? Are we using a top grade fuel? Is the unit in proper operating condition?

Unless your trucks can give a job performance comparable to that of your competitors' equipment, the other producer is apt to wind up with most of the important business.

In considering new trucks, study manufacturer's specifications. In purchasing new equipment, consider only makes and models of trucks that unquestionably meet all requirements on G.V.W., front axle carrying capacity, size of engine, torque, horsepower, frame strength, gear ratio, differential, transmission and tires.

An efficient producer uses great care in selecting a mixer truck driver. He properly trains the new employe. An experienced, competent, trustworthy driver is used to break in the new man. Determination as to the qualifications of a new driver is made before he has acquired seniority protection.

ACKNOWLEDGEMENT

• **Many individuals and companies** have generously assisted Mr. Nicholson in his preparation of this group of articles on Preventive Maintenance published as part of his series.

Mr. Nicholson wishes to especially acknowledge the cooperation and contributions of the following:

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John W. Winkworth, Winkworth Fuel and Supply Co., Detroit, Mich.

Driver Selection

While you can, get rid of the incompetent, the accident-prone driver and the trouble maker. Adopt a "man to a truck" policy. Hold a driver completely responsible for a truck placed in his care. Impress upon him that he is the principal factor in determining the operating life of his truck. Drive home to your new man the importance of daily checks on his mixer truck equipment. Don't ever let older drivers forget their responsibilities.

A producer once showed me operating cost records on two heavy duty trucks of the same make, model and year on which were mounted 1953 mixers of the same make and size. Truck "A," which had been driven throughout its operating life by a careful, experienced driver, showed operating and maintenance costs of approximately $2.00 less per cu. yd. than truck "B," which had been driven by a number of men, none of whom had shown the competence of the driver of truck "A." Obviously, truck "B" had never made any money for the producer.

Our own experiences, the above report and knowledge of other similar cases are convincing indications that a producer can practically cut unit maintenance costs in half by putting an efficient, careful driver on each and every mixer truck.

In addition to capably handling their trucks, in all phases of delivery operations, drivers share responsibility with the mechanic for proper maintenance of equipment intrusted to their care. Drivers can play important roles in the carrying out of effective lubrication and tire-care programs. The efficiency of greasers and tire-care men may be largely determined by the kind of cooperation that they receive from a company's drivers.

A cooperative driver can help make a lubrication program work by daily looking for leaks (under trucks, on housings and at axle hubs), keeping oils at proper levels, examining condition of engine oil, checking to see that oil changes are made in accordance with planned schedules, regularly inspecting oil filters, reporting the presence of oil in water or water in oil and operating his truck engine at proper temperature. In checking crankcase oil, an efficient driver carefully examines the gauge dip-stick for any indication of rust. He is always on the alert for any possible warning, such as noticeable thinning of the oil, discoloration or odor change. Idling and dust problems, faced by ready-mixed concrete trucks, require that drivers and mechanics give special attention to condition of oil filters and air cleaners.

Tire-care is a prime concern of all conscientious drivers. In warm weather, when loaded trucks move along at good speed, tires get extremely hot. When tire temperatures get up around 240 deg. F., crown breaks and ply separations are almost certain to occur. A mixture of overloading and speeding means trouble. During hot weather, a competent driver keeps down the speed of a loaded truck. He never speeds an overloaded truck. He sees to it that tires are properly inflated and is alerted to pressure "build-

(Continued on page 228)

Western Concrete Pipe Producers Annual Meeting

THE WESTERN CONCRETE PIPE ASSOCIATION held its annual meeting at the Hacienda Motel, Fresno, Calif., on April 19, 20 and 21. H. W. Chutter, Jourdan Concrete Pipe Co., Fresno, Calif., was re-elected president, and directors re-elected were: Harry Tellyer, Tellyer Concrete Pipe Co., Albuquerque, New Mexico; Wm. Hurst, Hurst Concrete Products, Santa Barbara, Calif.; and Ward W. Hughes, Concrete Conduit Co., Colton, Calif. Fred N. Linn, United Concrete Pipe Co., Modesto, Calif., was re-elected vice-president and Wm. S. Rogers, Rogers Materials Co., Madera, Calif., secretary-treasurer. There were about 100 registrations of which 75 were members. The Fall, 1955 meeting will be held in Reno, Nev.

The meeting on the first day was confined to a directors' dinner. Harold F. Peckworth, managing director, American Concrete Pipe Association, the first speaker on the second day, outlined the activities of the national association, reviewing the use of concrete pipe in culverts, for hydraulic purposes, and in sewers. In culvert work, he stressed the need for proper bedding and fill conditions, and said that producers should mark the "T" in culvert pipe to make inspection and laying easier. He reviewed the work at the Hunter Air Base near Savannah, Ga., where tests were made using corrugated steel and concrete pipe to determine the better types of joints. The 54-in. dia. pipe tested was placed under a flexible pavement used as bomber run-ways. Types of joints were hot and cold asphalt, rubber joints of several types, concrete mortar in concrete saddles for the concrete pipe, and corrugated iron pipes. The rubber joints and the concrete mortar joints in concrete saddles all held up. All corrugated pipe tests failed.

The main object of the test was to determine leakage at joints for in that area ground water levels are near the surface and any leaks in the pipe under the runways lets silt enter the pipe. This weakens the pavement foundation and failure soon follows. In corrugated metal pipe if silt comes in up to 5 percent under loads it is considered a failure. At these tests the silt in the iron pipe came in up to 7 percent.

Mr. Peckworth reviewed the problem of hydrogen sulphide in sewage saying that it was a universal problem and not confined to any one locality. The rate of absorption of oxygen, temperature of the sewage and rate flow in the pipe are factors to consider. Concentrated sewage tends to increase the amount of H_2S. He said that the collector systems used at Norfolk, Va., where pipe is kept full of liquid, less corrosion occurs as less oxygen is present. Where H_2S gas is trapped in pockets and no oxygen can be present, corrosion is practically nil. Corrosion takes place at turbulent points. Clay liners, it has been found, do not resist corrosion, the speaker said. Mr. Peckworth urged the western group to have representation on the A.S.T.M. committees related to concrete pipe. Business in the pipe industry has been increasing at the rate of around 1,000,000 tons per year with a need for more local promotional work. Mr. Peckworth said that President Eisenhower's road program was bogged down in politics.

The 8-ft. width truck loading restriction was discussed at the meeting. In the California Assembly, Bill No. 2704 proposes to increase the load width allowable from 96 in. to 100 in. This would permit cross loading of pipe with an 8-ft. laying length, for actually the tongue extends 2 to 4 in. farther. Adoption of the bill will permit larger loads and will save the taxpayers $8,000,000 to $9,000,000 during the next ten years. It was pointed out that public agencies are the largest buyers of concrete pipe.

The relative merits of the fill test was discussed, and it developed that the method is a fairly good barn-yard test but not a good A.S.T.M. measure. It was agreed that the fill test should be removed entirely from A.S.T.M. specifications. The hydrostatic test using 10 p.s.i. for 10 min. is sufficient to determine the quality of the pipe, it was pointed out.

P. N. Porter, oldest member, left, shaking hands with **G. D. Williamson,** oldest charter member

Left to right: Harold W. Chutter, president, G. D. Williamson, oldest charter member in the Western Concrete Pipe Association, and Howard F. Peckworth, managing director of the American Concrete Pipe Association

The Western Concrete Pipe Association maintains a testing and research laboratory in Fresno, and Ephraim Dyer, Jr., field engineer for the association, gave his report which included a visual demonstration of the sodium hydroxide test for "organics" in sand.

The use of light aluminum ladders instead of steps in manholes was discussed, and most of the group appeared to favor the use of the ladders for the steps are slippery, more costly, and more hazardous.

Harold Chutter acted as chairman for the meeting and brought up the subject of septic tanks; that cities were growing rapidly and many homes still required their use. It was proposed that a study be made to develop a possible use for concrete pipe in this field.

At the last day's session, George Feehan, labor relations consultant of the California Association of Employers gave a brief run-down of labor relations in California and the "Right-To-Work" law was briefly discussed. Mr. Chutter gave a report on a "Mechanized Mole" or core drilling rig that was used in a series of tests at the Hayward, Calif., plant of the American Pipe & Construction Co. Reinforced concrete pipe was easily and successfully drilled with the device. The intent was to get a suitable core for compression and absorption testing and, at the same time, permit the hole in the pipe to be later plugged with concrete and sold. The test report was written by E. E. Jackson, vice-president of the company. A "rebound test hammer" was also briefly described. It is a quick method of testing pipe and it was reported that

a Spokane producer had found good correlation between the results obtained with the rebound hammer, and compression tests.

Ernest C. Fortier, consultant on concrete pipe manufacture and installations described a test whereby leaks in laid concrete pipe were being lessened by the use of fibrous asbestos materials. The process mentioned by Mr. Fortier is still in the development stages, he pointed out. Otto Ehrenburg, soil technologist, Coast Laboratories, Fresno, Calif., talked about "Soil and Concrete Pipe Foundations." He discussed soil stability factors under loads and stressed benefits of compacted fills over and under concrete pipe installations. Sandy soils with 5 to 10 percent clay usually compact excellently.

Byron G. Dwyer, civil engineer, Tellyer Concrete Pipe Co., New Mexico and Texas talked on his "Experience With The Use of Concrete Pipe for Roadway Culverts." On a rather extensive program in New Mexico, the use of concrete pipe resulted in a saving of about $80,000 over corrugated iron or cast box-type concrete culverts. One section of a highway had 180 parallel lines of 30-in. dia. concrete pipe, 64 ft. long. This installation, now eight years old, has carried flood waters satisfactorily and is in good shape today. He said that concrete pipe with low absorption—less than 5 percent—was satisfactory regarding alkali penetration.

Charles H. Sortor, sales manager, Peerless Pump Division of Food Machinery and Chemical Corp., Fresno, Calif., closed the technical session with a discussion of "Overhead vs. Underground Irrigation Systems." He compared installation and operating costs, advantages and disadvantages of both systems.

The evening was devoted to a cocktail reception given by the associate

Ephraim Dyer, Jr., field engineer of the Western Concrete Pipe Association

NEW 6 TON SELF-PROPELLED BANTAM!

* IT SELLS FOR ONLY $11,500

Look what you get in the new CR-35!

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For making pipe by hand methods by either the wet or semi-dry process. Sizes for pipe from 10" to 120" and larger. Tongue and groove or bell end pipe in any length desired.

WRITE TODAY for complete information and estimates.

Also manufacturers of QUINN CONCRETE PIPE MACHINES

Quinn WIRE & IRON WORKS
BOONE, IOWA

ROCK PRODUCTS FEATURES TIMELY INDUSTRY NEWS EACH ISSUE

members of the Western Concrete Pipe Association followed by an informal dinner dance.

Prestressed Concrete

THE PRESTRESSED CONCRETE INSTITUTE has prepared a copy of its standard specifications for the design and manufacture of pretensioned, bonded, prestressed concrete structure, which are in agreement with the 318-51 American Concrete Institute building code. A section is devoted to materials, specifying the properties and strengths of strands, wires, reinforcing steel and concrete. Maximum allowable stresses in concrete at the time of transfer of prestressing are given for compression in bridge members, building members, etc. Maximum stresses under final dead and live load conditions are also given. Design details provide for the spacing of prestressing strands and/or wire, and the minimum distance from the concrete face to the center of a wire strand. Construction procedures are described, giving details up to the shipment of the prestressed concrete members. Copies of the specifications are available from the Prestressed Concrete Institute, P. O. Box 495, Lakeland, Fla.

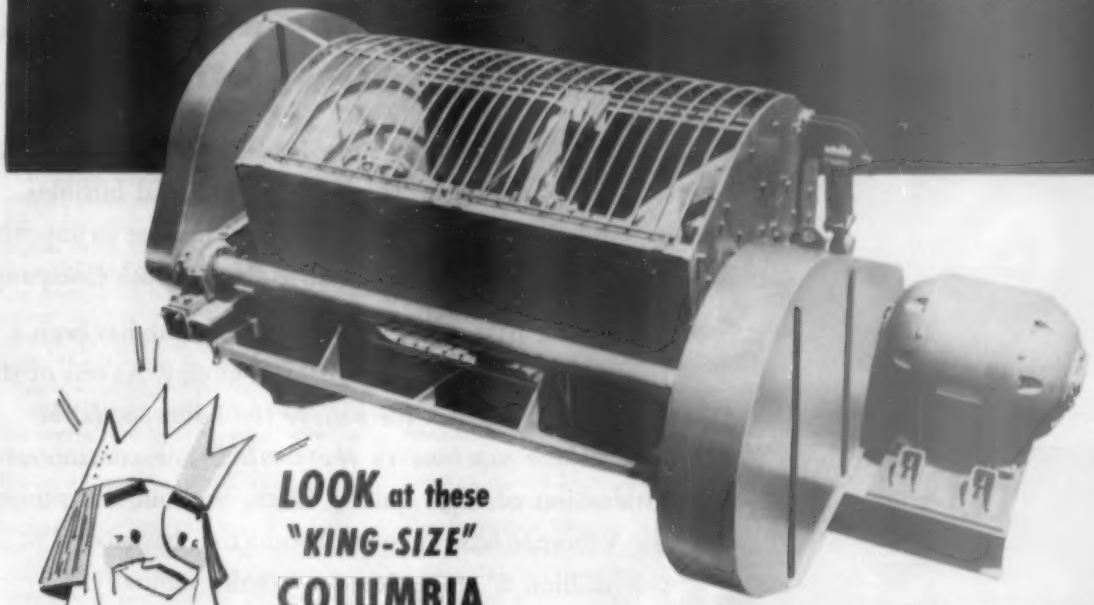
Granite-Like Panels

MARIETTA CONCRETE CORP., Marietta, Ohio has added to its products, concrete wall panels with exposed aggregate finishes, giving the appearance of granite. The aggregate finish was developed by Earley Studios, Rosslyn, Va. In manufacturing the panels, chips of black basalt, white marble and clear quartz are poured into 10- x 14-ft. forms. Reinforcing rods and wire mesh are then placed in the forms, and concrete is added and vibrated, resulting in a 5 in. thick panel weighing about 7000 lb. After the concrete hardens, the face of the panel is ground and muriatic acid is applied to produce the granite-like effect. The panels are then waterproofed with silicone, and fitted with tongue and groove joints and hooks for hoisting. Robert C. Stelzle is in charge of production, and Vernon G. Taylor, Jr., holds an advisory position.

Ready Mix — Precast Concrete

THE ATLANTIC ENGINEERING AND CONTRACTING CO., is building a ready-mixed concrete batching plant, office building, warehouse, and repair shop at Brunswick, Ga. The concrete plant will include facilities for sand and gravel and bulk cement storage. The company will manufacture pre-cast concrete bridge sections, as well as ready-mixed concrete. Walter Mendenhall is president of the firm, and Claude Chapman is vice-president.

Now! THE INDUSTRY'S LARGEST MOST EFFICIENT BATCH MIXER!



LOOK at these *"KING-SIZE"* COLUMBIA FEATURES:

1. Heavy duty SKF dustproof bearings.
2. Sheet steel parts accurately designed and cut.
3. Automatic self-discharging gate; blades discharge contents in 15 to 20 seconds.
4. Spiral blades, made of long-wearing Ni-hard steel, set at easy angle to reduce resistance.
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6. Rugged all-welded construction with I-beam base.
7. Low charging side allows use of batchers and measuring devices.
8. Heavy-duty 75-HP electric motor insures efficient operation with full loads. Heavy cut gears give positive drive and longer wear.
9. Toggle-type door control with locking lever for safety; safety grids made of heavy bars.

THE *Columbia* "75" with a capacity of

81 CUBIC FEET

Industry demand for a bigger, more powerful batch mixer has led to development of the Columbia "75", with a capacity of 81 cubic feet —the largest and most efficient mixer now in production. This mixer handles 10,000 pounds of semi-dry mix at a single charge.

The Model 75 is the "king size" mixer in a full line that also includes the Model 12 (12½ cu. ft.), Model 25 (27 cu. ft.), Model 40 (45 cu. ft.) and Model 50 (54 cu. ft.). All have the same rugged construction, safety features, adequate powering, and long life.

District Offices in: **Wisconsin, Ohio, South Carolina, Mississippi, Florida, New Jersey, Virginia, California, and Massachusetts.**

Write today for descriptive folder and specifications on batch mixers.

Columbia MACHINE

Home Office: 107 S. GRAND, VANCOUVER, WASHINGTON
Factory Branch and Warehouse at Mukwonago, Wisconsin

Another BESSER Booster*

* This is the 119th of a series of ads featuring leaders of the Concrete Products Industry who are stepping up block production with Besser Vibrapac machines.

The three Fricke boys, Robert, Roy and Dave standing next to one of the company cars.

Besser Vibrapac in Fricke plant. Note six 4" units produced at a time, on one Plain Pallet. Power off-bearing hoist simplifies removal of block.

National Guard Armory constructed of VIBRAPAC block, including Besser Bond Beam Block in both 8" and 12" sizes. All units supplied by Fricke Block Company.

VIBRAPAC Block Sales are Important Factor in this Modern Manitowoc Plant

Thirty-eight years ago, Wm. Fricke & Son, Manitowoc, Wisconsin, started in the building material business. By 1947, the block end of the business became so important, the company changed its name to Fricke Block Company.

During the past years, the Besser Vibrapac has been a vital factor in the success of the company. As one of the Fricke boys put it: *"We believe the Vibrapac is the finest block machine in the world"*. For continuous production of high quality block, without downtime, the Vibrapac has no equal. Production has soared to one million 8" units (or equivalent) annually.

If you intend to erect a new concrete products plant... or expand your present plant... consult a Besser engineer. He will gladly give you the benefit of his broad experience in this specialized field. Write today for further details.

BESSER COMPANY, Box 135, Alpena, Mich., U.S.A.

Complete Equipment for Concrete Block Plants

Yard scene at the Fricke plant. There is ample space for large stock piles of VIBRAPAC Block.

A 8338-1PBC

World's Leading Manufacturer of Concrete Block Machinery

Oregon Masonry Interests Pool Advertising and Promotion

FORMATION OF AN ORGANIZATION, known as the Unit Masonry Association of Oregon, comprising all segments of the masonry industry, promises to have a profound and beneficial effect on the state's masonry industry.

Included among the various classifications making up the membership of the association are concrete products plants, brick manufacturers, the Portland Chapter of the Mason Contractors Association of America, the bricklayers union, and building supply houses specializing in masonry materials. Membership in some classifications is already 100 percent complete.

The Unit Masonry Association is the second organization of its kind in the United States, the first having its birth in Seattle, Wash., nearly two years ago. The success of the two organizations and the potential benefits to be derived by the combined efforts of masonry manufacturers and contractors, members of the masons' unions, and material dealers in the promotion of masonry already promises to inspire other groups of its kind to form organizations. Salem and Eugene, Ore., are expected to form chapters and affiliate with the Portland group. Kansas City, Mo., also has organized a Unit Masonry Association.

Officers

Officers in the association and members of the board of trustees are: Ray F. Wimer, Columbia Brick Works, president; Montie Smallen, mason contractor, vice-president; Al Thomas, business representative of the Bricklayers Union Local No. 1 of Oregon, secretary; and George Erland, manager of Pacific Building Materials Co., treasurer.

Paul L. Nutt, sales manager, Smithwick Concrete Products, and chairman of the Public Relations and Advertising Committee, in announcing the purposes of the newly formed Unit Masonry Association of Oregon, states that it was formed "to weld the workers, manufacturers, distributors and equipment firms into a unit for expanding industry services and reaching highest goals of workmanship and quality of materials. Bringing the 'man-on-the-job' into the research and promotional activities of the organization is a new approach to keeping the industry moving forward and making jobs available for the thousands of people dependent on the masonry industry for their livelihood. The objectives of the organization include research on building practices and costs, new equipment uses, active participation in building code deliberation and close cooperation with government and civic agencies. The work of the association will be conducted through committees which will hold monthly meetings."

Other members of the public relations committee are: Ron Burke, president of Masons Local Union No. 1 of Oregon; Lyle Parsley, president of Portland Chapter Mason Contractors Association of America; Glenn Tidymann, sales representative of Masons Supply Co.; and Herb Priest, president of H. L. Priest Patent Scaffolding Co. The committee recently selected a local advertising agency to handle the account. They will work with the committee and plan the public relations and advertising program for the association.

Besides the officers and promotion committee members previously mentioned, other members of the Board of Trustees are: Lou Kramer, representative of the bricklayers union; Mike Boland, Empire Building Materials Co.; Roy Griffith, Washington Brick and Lime Co.; Herman Blaesing of Blaesing Granite Co.; and R. V. Portinga, mason contractor.

Advertising and Promotion

A number of Unit Masonry Association plans are already underway. A regular schedule of newspaper advertisements has begun. Special job signs bearing the words, "Another Unit Masonry Project," are available in black and orange colors for members to put up on all unit masonry projects. Decals for trucks and windows are being used by members; also newspaper drop-in mats. A news letter is being printed and mailed to all members every month. A membership roster folder is being distributed to architects, builders, contractors, engineers, school boards and the general public. The folder points up the sales features of unit masonry and lists all members of the association.

Part of the unit masonry program includes an annual apprentice bricklayers contest for the championship of the State of Oregon. Plans include an architects contest, a Unit Masonry Model Home and cooperation with annual local events, such as the Parade of Homes, Home Show, Annual Spring Flower Show and others. Appropriate news and photographs will be released to the press as the important events occur.

Public Relations and Advertising Committee studying layout and proofs to be used in promotion of masonry. Members are, seated, left to right: Herb. Priest, president of H. L. Priest Patent Scaffolding Co.; Paul L. Nutt, sales manager, Smithwick Concrete Products; Ray F. Wimer, Columbia Brick Works; Al Thomas, business representative of bricklayers' union; and Glenn Tidyman, Masons Supply Co. Standing, left to right: Ron Burk, president, bricklayers' union; Lyle Parsley, president, Portland Chapter, Mason Contractors Association of America; Joe Bennett and George Griffis of Pacific Advertising Agency

SHAKE CLEAN FAST

WITH THE

NATIONAL Car Shaker

Patented

- Soon pays for itself
- Keeps your men out of R R cars
- Simple one-man operation
- Quickly and easily installed in your plant

Write for a list of users in your area

National Conveyor & Supply Company

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MAKE $100 or MORE EVERY DAY with NATURA-STONE

The Long Contour BUILDING BLOCK More Beautiful than REAL STONE!

FREE Complete Sales Plan . . . including literature, 35 color slides and viewer.

Now earn $100 or more a day extra distributing "Natura-Stone," the new modern long contour building block with revolutionary new advantages and improvements. Nothing else like it on the market! Looks like real cut stone. More beautiful than real stone in color and design. In great demand by builders and contractors. Act now! Only a limited number of franchises available. Write today for full information.

Natura-Stone Co., 4213 Groveland Ave., Balto. 15, Md.

KEEP ABREAST WITH INDUSTRY TRENDS THROUGH ROCK PRODUCTS

Pipe Manufacturer Diversifies

(Continued from page 208)

brick, vitrified clay wall coping and flue lining.

Fleet of 43 Trucks

For all its plants, the company operates a fleet of 43 trucks including 1-ton pickups, 1½ and 2-ton flatbeds and stake bodies, 6-wheel float trailers, dump trucks and a "low boy." To keep this fleet running the company operates a modern garage staffed by skilled mechanics who perform all servicing operations and necessary rebuilding of vehicles.

Adjoining the garage is a completely equipped machine shop with lathes, planers, shapers, drills and other essential equipment likely to be required in the maintenance of any of the machines in either the pipe or block plant.

General Office Building

General offices are located at 3010 Dixie Drive, in an air-conditioned building constructed of lightweight concrete masonry units made by the company. The building contains 4000-sq. ft. of floor space and is divided into a large display room at the front with private offices and bookkeeping department in the rear. About 30 members of the executive, sales and administrative staff occupy the building.

Officers of Black-Brollier, Inc. include George W. Black, president; William F. Smith, Ben A. Brollier and Lee E. Brollier, Jr., vice-presidents; Ernest Black, secretary-treasurer; W. J. Hunley, assistant general manager and A. Scott Grivas, production manager.

Perlite Operation

Perlite of Houston, Inc., a subsidiary of Black-Brollier, Inc., was established in 1951. It operates a perlite processing plant at 502 Fauna Ave. in Houston. Expanded perlite under the trade name "Permalite" is packaged and sold through a franchise from the Great Lakes Carbon Corp.

Perlite ore from western mines of the Great Lakes Carbon Corp. is delivered in railroad box cars. A 2000-lb. Hyster lift truck with a front-end scoop unloads the raw ore into underground storage bins and is also used in stockpiling material on pallets and in loading bags on trucks and in box cars.

An unusual feature of the plant operation is the lifting of the ore pneumatically from the storage bins to an overhead hopper. The ore then feeds into a vertical furnace by gravity and after expansion is carried by air

through cooling tubes and cyclones into an automatic sacker. The plant capacity is 75 to 80, 4-cu. ft. bags per hr.

Officers of Perlite of Houston, Inc. are: William F. Smith, president; George W. Black, and Ernest Black, vice-presidents and Ben A. Brollier, secretary-treasurer. General offices of Perlite of Houston, Inc. are at 3010 Dixie Drive, also the offices of Black-Brollier, Inc.

High Pressure Steam Curing Report

THE NATIONAL CONCRETE MASONRY ASSOCIATION has published a 143-page manual on "Layout, Design and Installation of High Pressure Steam Systems for Curing Concrete Masonry Units," which completes the second phase of the program outlined by the association's Subcommittee on High Pressure Steam Curing. The first phase was the publication, "Annotated Bibliography on High Pressure Steam Curing of Concrete and Related Subjects," and the third phase will consist of technical research on various details of high pressure steam curing.

The manual is a thorough and detailed report pertaining to autoclaves, boilers and collateral facilities, and features such topics as: Autoclaves; General Layout and Description; Estimating Steam Required; Boiler Room and Equipment; Piping; Vacuum System Requirements; Operational Controls; Future Requirements—Relation to Other Facilities; Cost of Installations; and Two Phase Curing. Ten engineered drawings illustrate plant layouts, autoclave foundations, block racks, and autoclave piping systems.

The book was prepared by St. John, Platt and Carlson, consulting engineers of Buffalo and Binghamton, N. Y., with the assistance of several concrete block producers and the N.C.M.A. Subcommittee consisting of R. N. Dills, Noel D. Harter, Joseph Nagy, Louis Freedman, Fred Reinhold, Cedric Willson and an ex officio member, R. E. Copeland.

Concrete Specifications

THE NATIONAL READY MIXED CONCRETE ASSOCIATION recently published the second edition of Publication No. 47, "Specifications and Test Methods for Ready-Mixed Concrete." Principal revisions are in the A.S.T.M. specifications for ready-mixed concrete. The booklet also gives N.R.M.C.A. standards; truck mixer and agitator standards of the Truck Mixer Manufacturers Bureau; recommended practices for sampling and testing ready-mixed concrete; and as appendices, five current A.S.T.M. standard methods pertinent to the testing of concrete.

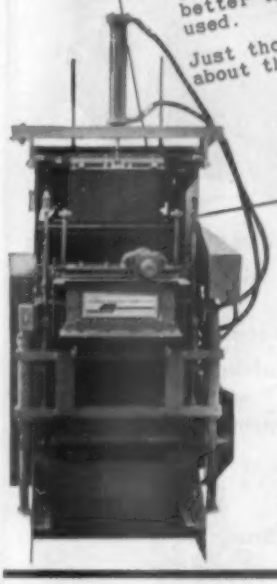
W. E. BECK & SON
Material Contractors
SAND, GRAVEL AND STONE
270 S. 47TH STREET • PHONE 1307
ALTAMONT, ILL.

Fleming Manufacturing Company
400 Fleming Avenue
Cuba, Missouri

Gentlemen:
The other day a man visited our plant and asked about our new FMC-180. I told him we were 100% satisfied and find that we have doubled our production and lowered our labor cost one-third, thanks to the FMC-180. We think it is a fine piece of equipment and better than any other that we have used.

Just thought you would like to know about this. Sincerely yours,

W. E. Beck and Son



MR. W. E. BECK
W. E. Beck & Son
Altamont, Illinois

...doubled production,
lowered production cost by ⅓,
thanks to the FMC-180"
AUTOMATIC CONCRETE BLOCK MACHINE

Just as with Mr. Beck, the FMC-180 has been the answer to higher profits, lower production costs, for block producers throughout the nation. It'll pay you to investigate.

MAIL THE COUPON TODAY!

MAIL TODAY!

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MANUFACTURING CO.
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CUBA, MO.
PHONE: CUBA 400

Gentlemen: Please rush complete information, including specifications, prices and terms on the low-priced, fully-automatic FMC-180 concrete block machine.

Also request information on:
☐ Automatic Double Block Machine
☐ FMC Stationary Mixers
☐ Flem-Stone Automatic Block Splitter CP

Name
Firm
Address
City Zone State

KEEP ABREAST WITH INDUSTRY TRENDS THROUGH ROCK PRODUCTS

CONCRETE BURIAL VAULTS
AMERICA'S FINEST MOLDS AND LOWERING DEVICES
BERG VAULT SYSTEM
BERG VAULT CO.
EQUIPMENT DIVISION

FEATURES *Plus*...
PERFORMANCE *Plus*...
***in this* KENTWIN**
BLOCKMAKER
PLAIN PALLET MACHINE

Now Available with the NEW KENT FRONT PALLET RETURN
Provides **"ONE MAN OPERATION"**

- **Low in Comparative Cost**
- **Available to fit any pallet size down to 18" x 18".**
- **No extra motors or controls.**
- **Can be installed on any Kentwin in the field.**

WRITE FOR FULL PARTICULARS

Push Button Control with automatic continuous cycling.

One Masterbox which permits using low cost interchangeable insert molds.

Simplified Hydraulic Operation with direct acting cylinders.

AGITATION assures uniform delivery of aggregate to the mold box.

VIBRATION of mold box assures uniform density of blocks.

Positive Block Sizing with electric control.

Floor Level Installation.

Ruggedly Built with Antifriction Bearings throughout.

Available now in 3 models; with Automatic Pallet return and electro-magnetic off-bearing hoist, if desired.

The **KENT MACHINE COMPANY**
CUYAHOGA FALLS, OHIO
CONCRETE PRODUCTS MACHINERY SINCE 1925
Canadian Distributor: Wettlaufer Equipment, Ltd., 49 Merton St., Toronto 12, Ontario

ROCK PRODUCTS
THE
Recognized Authority
OF THE
Non-Metallic
Minerals Industry

Prestressed Concrete

(Continued from page 215)

graphs of a stress-strain curve on 250,000 p.s.i. steel with an elongation of 10-in. Steel stressed at 95 percent of tensile strength, he said, after 100 hr. showed very little further elongation.

Mr. Everling's slides included a picture of a 100-ft. tensioning bed in the laboratory to measure and record loss in tension. He said no critical points were found and there is no likelihood of fatigue failure in steel used in prestressing. The speaker also said there has been no single instance of a failure of prestressed concrete involving corrosion of stressing steel.

Although there are as yet no conclusive test results on the fire resistance of prestressed concrete, American and British fire test data up to the present time, indicate that the critical temperature is around 750 deg. F. Thor Germundsson, manager of the structural and railways bureau of the Portland Cement Association offered that statement in discussing "Notes on Fire Resistance of Prestressed Concrete."

"There are frequent questions on the fire resistance of prestressed concrete," Mr. Germundsson said. "There have been many tests on conventional concrete, and there is enough data to indicate that prestressed concrete will meet building code requirements for fire resistance.

"Tests indicate that billet steel will lose half its strength at 1000 deg. F. Therefore the most important thing is to see that the steel in prestressed concrete does not go above 1000 deg. It is necessary to have protection for steel reinforcement. Concrete provides protection and insulation from heat. One and one-half to 2 in. of concrete affords good protection.

"Some tests indicate that the critical temperature is around 750 deg. F. When prestressing wires reach 750 deg. failure is imminent."

Mr. Germundsson described British tests of the fire resistance of prestressed concrete, some of which were made for the British at the National Bureau of Standards in this country. Some of the results of these tests, he said were reported before the Highway Research Board. Indications were from deflection curve readings, that the damage usually occurs in the last 15 min. of a fire before failure. The speaker said that the Portland Cement Association is continuing an extensive fire test program on prestressed concrete but that no report will be published until the tests are concluded.

Prof. W. J. Eney, head of the civil engineering department of Lehigh

University, Bethlehem, Pa., delivered a paper on "Strand Research." He described the work done at Lehigh in testing pretensioned and post-tensioned beams. Both laboratory and field tests were carried out. Field tests were made on a 30-ft. prestressed bridge. Lehigh University has a 5,000,000-lb. compression testing machine, Prof. Eney said, for the testing of large columns and slabs.

Panel Discussions

The meeting closed with panel discussions of problems arising in the prestressed concrete industry. F. S. Burtch of John A. Roebling's Sons Corp. was moderator. Panel members were: William E. Dean, chief bridge engineer, State of Florida; Mario G. Suarez, civil engineer, Havana, Cuba; Prof. W. J. Eney, Lehigh University; H. H. Edwards, president Lakeland Engineering Associates; George W. Ford, vice-president R. H. Wright & Sons, Inc., Ft. Lauderdale; W. O. Everling, American Steel & Wire Div., U. S. Steel Corp.; Dr. T. Y. Lin, University of California; R. M. Dubois, president of the Freyssinet Co., New York and Ross Bryan, Nashville, Tenn.

A question from the floor as to the most important aspects of quality control, was answered by Mr. Ford who said proper working drawings, close inspection and accurate testing were of importance in that order. Experienced erectors are highly important, Mr. Ford said, and frequently help to sell the product. He said erection costs of double-tee units ranged from 12¢ to 17¢ per sq. ft., depending on the length of the haul and the job.

In answer to a question from Mr. Edwards as to the driving characteristics of prestressed concrete piles for bridges, Mr. Dean said, "The performance of prestressed piles is so far ahead of the conventional piles that there is no basis of comparison. The abuse and rough handling the prestressed piles will take must be seen to be believed."

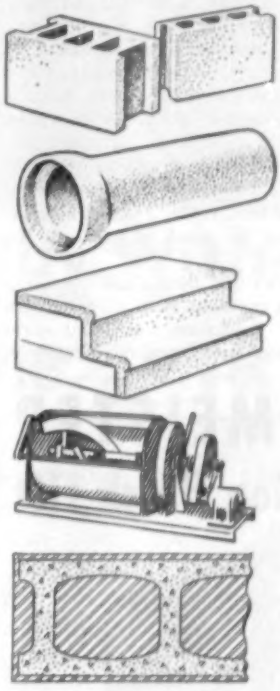
In response to a question from Mr. Dubois, Prof. Suarez of Cuba said the cost of prestressed long bridge spans is lower than other types of construction. A box girder type, 250-ft. prestressed concrete bridge in Cuba was erected at a cost of $24 per sq. ft.

Officers of the Prestressed Concrete Institute for the coming year were elected as follows: George W. Ford, Ft. Lauderdale, president; Ashton Gray, Leesburg, Fla., vice-president; H. H. Edwards, Lakeland, Fla., secretary - treasurer. Directors are Sam Johnson, Sarasota, Fla., Dr. T. Y. Lin, Berkeley, Calif., Matt Peavey, Jackson, Miss. and Douglas Cone, Tampa.

How Some Manufacturers Make *BETTER* Concrete Products at *LOWER* Cost, with *FLY ASH*

Fly Ash is a low-cost product. It is an extremely fine, wettable powder, mainly silica and alumina. Most of its particles are spherical in shape. It is a highly effective Pozzolan.

Many alert manufacturers, using a percentage of Fly Ash with the Portland cement, turn out a concrete of equal or improved qualities at a substantial saving in cost of materials.



Compressive Strength: Fly Ash Increases It

Many independent tests on concrete products made with a percentage of Fly Ash have shown equal or better 28-day compressive strengths as compared to those made with straight Portland cement. There is little or no reduction in 3-day strengths, especially where steam curing is used.

Sulfate Resistance: Fly Ash Improves It

Sulfate resistance is highly important in concrete sewer pipe. Tests on specimens of concrete containing a portion of Fly Ash showed greater resistance to the action of sulfate waters than did straight Portland cement concrete.

Finish and Texture: Fly Ash Makes Both Better

Comparisons show that concrete products made with mixes containing a percentage of Fly Ash have sharper edges and corners . . . smoother, more uniform surfaces . . . than products made with straight Portland cement.

Life of Machines and Moulds: Fly Ash Lengthens It

Fine, spherical particles of Fly Ash have a "ball bearing" action which increases flow and plasticity of the concrete and reduces abrasion. This means less wear on mixer blades, hoppers and moulds—longer life of your equipment.

Filling Moulds and Frames: Fly Ash Helps It

The greater plasticity of concrete containing Fly Ash reduces adhesion to pallets, and permits faster and more complete filling of moulds.

FLY ASH improves Compressive Strength, Texture, Finish, Sharpness of Edges and Corners, and Uniformity of Color of the Concrete.

FLY ASH increases "Green" Strength, Resistance of the Concrete to Penetration by Water, and Resistance to Action of Sulfuric Acid and Sulfates.

FLY ASH reduces Cost of Materials, Maintenance on Wearing Parts, Sticking to Pallets and Moulds, Cracking in Handling of the Concrete.

Write for Information or Technical Help

It costs nothing to get the facts on Fly Ash; it might mean a great deal in the success of your operation. Contact any of the following for specific information and technical data on use of their Fly Ash of proven performance.

CHICAGO FLY ASH COMPANY
228 N. La Salle St., Chicago 1, Ill.

G. & W. H. CORSON, INC.
Plymouth Meeting, Pennsylvania

DETROIT EDISON COMPANY
2000 Second Ave., Detroit 26, Mich.

ATLAS FLY ASH, INC.
2450 William St., Buffalo 6, N. Y.

Truck Maintenance

(Continued from page 217)

up." He regularly attempts to equalize loads among tandem tires. He reports mis-matched tires to the responsible employe. If truck tires need replacement, he seeks to break in new tires, before warm weather arrives. He avoids hitting bumps, striking objects and grazing curbs. A competent driver (through daily checking of condition of tires and careful driving) provides the key to effective tire-cost controls.

A driver, through proper care and operation, can assure a long useful life for the battery on his truck. An efficient driver makes certain that electrolyte is maintained at the proper level (1½ in. to ⅜ in. above plate separators), regular checks are made with the hydrometer, and that terminals are kept free of corrosion. He limits starter use to 30 seconds in any one cycle. He sees to it that the battery is fully charged at all times. He helps the battery perform efficiently by using the right kind of engine oil for the time of the year, maintaining distributor points and spark plugs in good condition, determining that battery is securely carried and engine well grounded, regularly ascertaining that all connections are tight, checking choke valve operation and carburetor adjustment and keeping good compression in the engine. In both warm weather and freezing temperatures he gives his truck's battery special attention. A good driver is never caught with "his battery down."

As pointed out in the discussion on Control Forms, daily reports, prepared by drivers, should be the basis for all operating data and mixer truck costs; the part on operating condition of equipment should be the foundation for an effective preventive maintenance program. From information furnished by drivers and maintenance employes, daily operating data and mixer truck costs should be entered on the Daily Truck Cost Record, then be periodically posted and broken down to give a monthly, quarterly and yearly analysis of the delivery operations.

At our plants, drivers are required to daily certify, on the Operating Condition Report, that they have made a specified number of checks on trucks and mixers as well as list items that need attention (see backside of Form A). It is a policy of our company to accept, at face value, a driver's declaration that his truck is not safe for operation.

Driver's daily checks and operating condition opinions help to avoid unnecessary downtime, cut down number of road calls, prevent accidents, assist supervisor in planning maintenance schedules, route trucks to the garage for inspecting, tightening and minor repairing (instead of breakdowns and major repairs), lessen replacement parts costs and reduce overall operating and maintenance expense.

Several times during the past year, I have spoken before classes of cement finisher apprentices. Some of the Building Trades are doing a good job in career development. Apprentice training helps produce competent journeymen. Driver selection in the ready-mixed concrete industry is quite a different story. Many producers put a driver on a $12,000—$15,000 truck and mixer combination, perhaps not even knowing if the new employe has a chauffeur's license.

It takes ability, training, experience and technical knowledge to make good operators of truck and mixer equipment. Necessary information, covering their work, must be made available to drivers. They in turn must carefully study this information. Most producers have not adequately met this problem. The Teamster's Union, even though offering seniority protection to employes of only one month's standing, has done little in "Driver Training." For too long a time, this union has been able to get by on the assumption that any driver is a satisfactory driver.

In many urban communities, producers, operating union plants, have retained seniority protected drivers, regardless of personal ability or value to the company, attempting only to release those whom they were clearly able to prove guilty of drunkenness or stealing. Largely because of the known protective attitude of the union, most of us have, on our payrolls, a number of incompetent drivers. The union is dead wrong in extending job protection to undependable, incompetent drivers. Similarly, many of us have been negligent in not pressing for more releases.

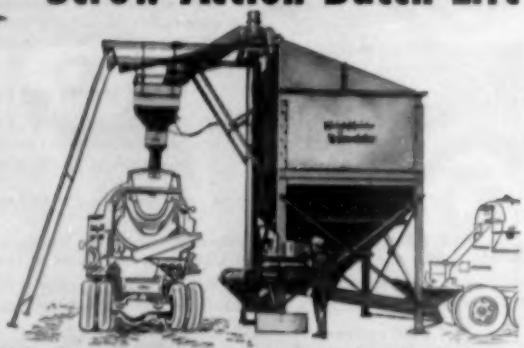
Unquestionably, we also have drivers who are sincerely interested in doing a better job, determined to give their trucks the best possible care and desirous of operating their equipment in the most efficient manner. Again, both the union and employers have failed to provide necessary job-helping information for drivers of this description. Trucks will operate efficiently and economically for a number of years under the right kind of drivers; but for only a year or two, when handled by some men. Many drivers are regularly guilty of practices that are the cause of excessive down-time, high maintenance costs and short operating lives for their trucks.

(To be continued)

NEW

WEIGHMEISTER

Screw-Action Batch Lift



Self-Contained

Portable

Accurate

Automatic Operation

Fast

Fast-working screw lift gives WeighMeister its large capacity for handling bulk cement. The precision-fed batcher and automatic electro-pneumatic controls provide dependable, accurate, constantly uniform mixes. One man can operate the WeighMeister with three push buttons . . . and it's *completely self-contained!* It's equipped with compressor, automatic controls and electric motor or gas engine. All air and electric lines are permanent; no connections to waste time in moving. Can be moved on a single truck. Needs no footings or ramps. Just set WeighMeister on a firm level spot . . . and have it running in a short time. See your distributor or write for details. L. Burmeister Co., 4533 W. Mitchell St., Milwaukee 14, Wis.

COMPLETE PLANTS FROM A SINGLE SOURCE

Burmeister

L. BURMEISTER CO., 4529 W. MITCHELL ST., MILWAUKEE 14, WISCONSIN

A Better Buy With Local Supply

—Genuine CLARK Parts

Your local Clark dealer provides service facilities that have been developed for your needs. You expect the best from your Clark trucks and your Clark dealer is there to see that you get it. You get a complete *service package* at your local Clark dealer.

LARGEST SUPPLY—Your local Clark dealer's parts inventory is based on machine population. You get mobile service for emergencies . . . for preventative maintenance at your plant.

QUALITY PARTS—Your source for Genuine Clark parts. Designed specifically for your equipment . . . engineered to outlast, outperform any substitutes.

ONE SOURCE—for quality rebuilding, maintenance, parts, and mobile service. Complete, modern facilities offer the best in service . . . at lowest cost.

FACTORY TRAINED MECHANICS—use specially designed tools and test equipment . . . know your equipment best.

CLARK EQUIPMENT

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 60, Michigan

A BETTER BUY WITH LOCAL SUPPLY—GENUINE CLARK PARTS

COMMENT
from the
BUTLER ENGINEER

Butler Makes Fortune (April Issue)

We've just learned that Butler Roadbuilders Plants are to be a feature of an article in FORTUNE which discusses the 100 billion dollar Highway Program.

We've always suspected Butler equipment was tops but it pleasures us no end to have our suspicion substantiated by our selection for this great magazine.

This article will, in part, deal with the Turnpike type of construction for which Butler Bin has developed an electronic, *one-man-operated,* completely automatic Roadbuilders Plant. Incidentally, as if one-man-operation is not important enough, these new Butler Plants are far and away the most portable ever built. Any questions? Please write.

The Butler Engineer — in fact everyone in the organization — not infrequently goes to unusual lengths to lend a helping hand. F'r instance, a customer ordered a Ready Mix Plant. Gonna erect it along a track out in the country beyond the edge of town. Got his garage and shop built when suddenly everyone in the area raised a sky-shaking squawk. This despite the fact that the location had been zoned for industrial development for 30 years . . . Our customer 'phoned me and asked me to meet with the Town Board at a public hearing — at 8:00 P.M. of a Saturday night. Nice time for a meeting. But I grabbed a 'plane and flew several hundred miles to speak my piece in our customer's behalf. Won't go into details, but some of the hysterical protests were so ridiculous as to be side-splitting. Anyway, "It was a tough fight, Mom, but we won."

Look at FORTUNE — April Issue.

The Butler Engineer

BUTLER BIN COMPANY
WAUKESHA, WISCONSIN

Radio and T-V Advertising

THE NATIONAL CONCRETE MASONRY ASSOCIATION, as a part of its promotional program, has issued to its membership a bulletin giving suggestions and general principles to be considered in gaining the maximum benefits possible in radio and T-V advertising. The suggestions, which should prove helpful to any producer considering sales promotion via the air waves, were, in part, as follows:

1. When buying radio or T-V time, strive to reach your prospective customers when they are most likely to have their minds on the product you want to sell, such as "build it yourself" prospects, just before the weekend when they might be planning projects to do.

2. Even in T-V areas, radio still offers good opportunity for reaching the entire family — the housewife in the daytime, and the other family members in the early morning or late evening (after T-V) hours, and during the dinner hour. Also, car radios offer a potential audience.

3. Don't overlook the possibility of advertising in "personality" shows, both on radio and T-V, but be sure the "personality" is one suited to your potential buyers.

4. In selecting radio and T-V time, buy times that will reach the people you want to reach rather than just the "high-listening audiences."

5. Some producers with sizeable budgets have built up good listening audiences for 15- and 30-min. radio shows over a long period of time. However, such shows are costly and often involve a long experimental period during which show prestige must be built up. Therefore, 1-min. and chain-break radio spots between or within established programs offer the best answer for most producers.

6. For T-V, 20-sec. between-show spots usually are the only ones that can be purchased for local use during peak listening hours, but you can sometimes participate as a co-sponsor of a program, or get 1-min. spots within a program during desirable evening hours.

7. Consider "saturation" spot use as opposed to a scattered effort, which means it is best to buy a considerable number of radio spot announcements on one or more radio stations in a one-, two- or three-day period. (Some stations offer special package rates for special promotion periods.) Pick a good spot within a station and buy as many spots as you can afford during the hours of the day that will carry your message to the audience you want to reach.

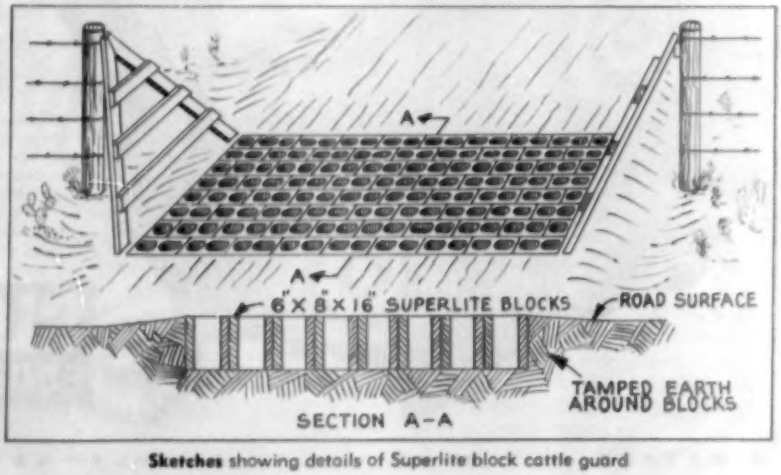
8. Avoid buying long-term contracts — even at seemingly attractive low rates — until you have experimented with and carefully checked inquiry response.

Ready-Mix Plant Improvement

ELSINORE READY-MIX CONCRETE CO. has installed a cement storage silo at its plant at Elsinore, Calif. The silo is of steel construction, stands 42 ft. from ground level to the top, and has a capacity of 160 bbl. of dry cement. A ton of steel and 20 cu. yd. of concrete were used in the silo foundation. Plant improvements also include the installation of a 20,000-lb. scale for weighing sand, crushed stone and cement.

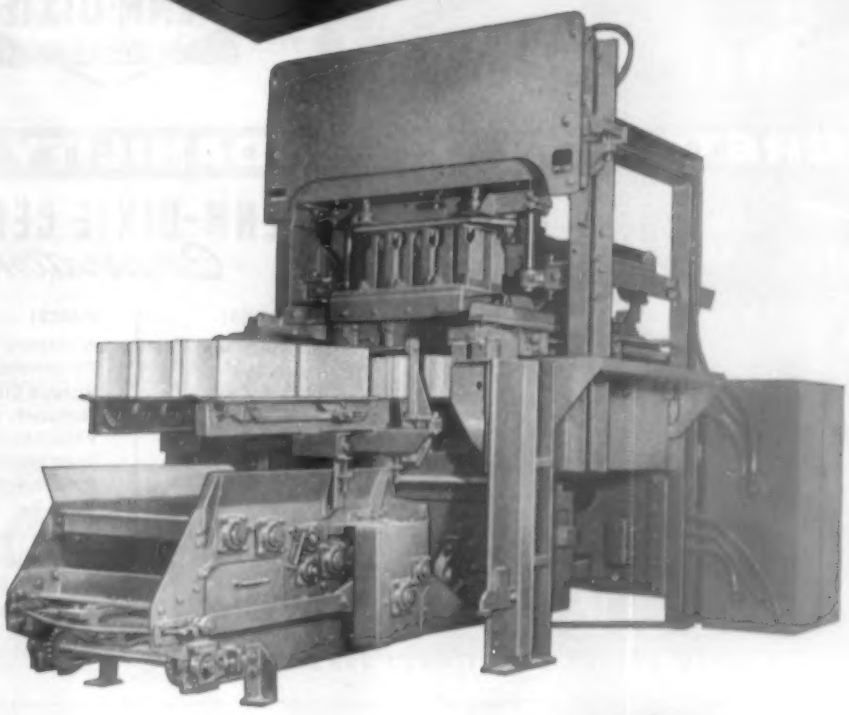
Concrete Block Cattle Guard

BUILDERS SUPPLY CORP., Phoenix, Ariz., recently announced the development of a low-cost cattle guard made with 6- x 8- x 16-in. "Superlite" block, laid in bond with the openings up. The cattle guards, which require no steel rails, can be made to any length desired and are said to be particularly suitable for use on secondary roads.



Sketches showing details of Superlite block cattle guard

YOU GET LOWEST UNIT COST



WITH A GOCORP "SENIOR"

HERE'S WHY

- **YOU USE LESS CEMENT**— Users tells us that GOCORP Plain Pallet machines use up to 10% less cement than competitive makes because they pack better.
- **YOU HAVE LESS DOWNTIME** —The smooth, unhurried hydraulic drive means trouble-free performance — slashes maintenance costs. A typical owner reports that his maintenance averaged less than two tenths of a cent per unit over a four-year period, including mold boxes.
- **YOU GET FEWER CULLS** — As low as one tenth of one percent of production they tell us. Green blocks have uniform density, stand up better during handling.
- **YOU GET GREATER PRODUCTION** — Sequence operation means easier, quicker adjustments. Higher production of quality block.
- **ADVANCED DESIGN**—Assures years of high production without fear of obsolescence.

MAKE US PROVE IT —
No foolin', write today and ask us for names, facts and figures to back up these statements.

AUTOMATION MEANS RACKMAN—for tops in performance, it's the "Senior" plus RACK-MAN (GOCORP's revolutionary automatic rack loading device).

GO CORP
ADRIAN-MICH.

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PENN-DIXIE
CEMENT

CONCRETE FOR DEPENDABILITY

PENN-DIXIE CEMENT *Corporation*

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Make Money Manufacturing CEMENT DRAIN TILE

Today's tremendous demand for drain tile opens up a choice field for the wide-awake concrete products manufacturer. Either as a business by itself or as a profitable addition to the regular line.

The Champion machine makes all sizes of tile up to 12-inch diameter. With such a range you can supply not only the huge farm market, but many others where drain tile is urgently needed —reclamation projects, home building, road construction, subdivision activities, etc.

CHAMPION DRAIN TILE MACHINE

Tile made on the Champion are outstanding in quality—dense, strong, uniform. Far better than clay tile, yet can sell for less—even after allowing a handsome profit on manufacturing operations. The Champion machine is simple, compact, easy to operate.

Get the facts. Write for interesting literature about the business and the moderate priced equipment. A real opportunity.

W. E. DUNN MFG. CO.
828 W. 24th Street • Holland, Michigan
CANADA: Dunn Masonry Machinery, Ltd.
978 Dundas H'way, Cooksville, Ont.

T-2

Do you use LIME PROOF COLORS?

If you concern yourself in any way with the coloring of mortar, cement, concrete, or stucco, we would like to send you our new folder of color chips and formulations. There is no obligation on your part whatsoever.

IRON OXIDE
JLS
PIGMENTS

Established 1854

J. LEE SMITH
and Company, Inc.
25 ANN ST., NEW YORK 38, N.Y.

PLANTS:
Hiwassee, Va. Pulaski, Va.

SAVINGS ON CRANE RENTAL

One-Man Operation of JOB-PROVED Fork Lift Truck Cuts Payroll by TWO for CONCRETE PIPE CO. OF OHIO, INC

The Concrete Pipe Company of Ohio, Inc., has had the economies of Gerlinger mechanical handling soundly . . . and profitably . . . proved. Previously, the firm was forced to rent a portable crane which required three men full time to operate and service. Today, a Gerlinger fork lift truck (1) does the work of the rented crane, (2) transports pipe in yard and drying kilns, and (3) loads trucks . . . *all a ONE-man operation!* Now, three Gerlingers are kept busy at the North Randall, Ohio, and Erie, Pa., plants.

For specific data to fit your particular operation, see your Gerlinger dealer or drop a postal to the Gerlinger Carrier Company, Dallas, Oregon, now. A request will bring you the new fork lift truck catalog. No obligation.

G-409

PAY FOR GERLINGER IN LESS THAN ONE YEAR!

"S" SERIES FORK LIFT TRUCKS
5 short wheelbase (106") models
4 to 8-ton capacity
Lifting heights from 10' up to 18'

"L" SERIES FORK LIFT TRUCKS
6 long wheelbase (130") models
6 to 11-ton capacity
Lifting heights from 10' up to 24'

GERLINGER CARRIER CO.

GERLINGER CARRIER CO., DALLAS, OREGON

Front view showing operator feeding block into BES-STONE Block Splitter.

Make this your BEST year with the BES-STONE Block Splitter

Expand Your Opportunities — Cash in on the Split Block demand. Its "quarried stone" character pleases owners. You'll find it ideal for all structures, large or small . . . commercial, institutional or home construction. BES-STONE challenges the creative ability of both architects and builders.

Splitters in 18" and 24" sizes — Automatic, powerful, hydraulic operation . . . up to 960 Split Block per hour. Straight line cuts . . . No cull block. Easily adjustable for splitting various block heights. Block is placed under knife, automatically. And the finished Split Block is automatically removed from under the splitting knife by the incoming block. Quiet, safe operation.

PONY BLOCK TRIMMER
Indispensable tool for on the job. Trims off the end of any block up to 8" by hand operated, hydraulic pump. Capacity 12 tons. Legs easily removable. Compact. Lightweight. Easily portable.

Fast, Accurate

Profitable Producer of 960 Split Block per Hour!

There's big money for you in attractive, permanently colorful BES-STONE Split Block. It complements and increases sales of standard stripper block. Get all the facts. Write for BES-STONE Bulletins 95A and 100.

Note the natural beauty of BES-STONE. No maintenance, no painting, no peeling off.

BES-STONE *the Split Block with Character*

BESSER COMPANY • Complete Equipment for Concrete Block Plants • Alpena, Michigan, U. S. A.

USE Trinity White

the whitest white Portland cement

. . . for the utmost beauty in architectural concrete units . . . terrazzo . . . stucco . . . light-reflective uses . . . and better color jobs.

Use Trinity White Cement when you want the permanence and workability of a portland cement plus the remarkable beauty of a brilliant white. So when you're asked for something that is better than the ordinary—you'll find that making it of Trinity White Cement is a most constructive suggestion. It's a true portland and meets all Federal and ASTM specifications. For descriptive literature, write Trinity White, 111 W. Monroe St., Chicago.

A Product of GENERAL PORTLAND CEMENT CO. • Chicago • Dallas • Chattanooga • Tampa • Los Angeles

Automatic HYDRAULIC CHUTE CONTROL

DYNA CHUTE

Gives Unlimited Mobility to Your Mixer Chute

Elevates the delivery chute in less than 10 seconds. Fits new or existing Transit Concrete Mixers and does a reliable job of lifting in a jiffy. Hydraulically powered by truck battery.

AUTOMATIC
Smooth power positioning of your mixer chute to just the right delivery height — fast and easy.

HYDRAULIC
Controls, holds . . . and does all the work instantly at the flick of a switch.

RUGGED
Built to raise a ton or more — you don't take "muscle men" from other jobs.

SAFE
No struggle with the chute to move it up or down. No fiddling with pins to plug the slip joint spacer holes.

Write for illustrated folder and your Dealer's Name

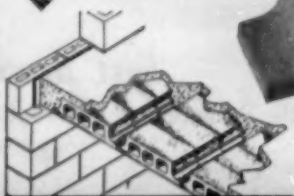
MONARCH Road Machinery Co. *Hydraulic Div.*
1331 Michigan St. N.E. — GRAND RAPIDS, MICHIGAN

MORE PROFIT FOR YOU with SOFFIT BLOCK
(Floor Filler Block)

Modern Soffit Filler Block floors and roofs meet building code standards . . . endorsed by architects and builders . . . ideal for radiant heat systems . . . many other advantages!

MAKES FLOORS and ROOFS *permanently* FIRESAFE, RIGID, ECONOMICAL!

Section of Soffit Filler Block floor, showing integral joist and slab of reinforced concrete.



You can make them on this BESSER VIBRAPAC

Soffit Filler Block, as well as all styles and sizes of concrete load-bearing block, are made on this same machine, with one set of Plain Pallets.

Write for Bulletin No. 77

BESSER COMPANY
ALPENA, MICHIGAN, U. S. A.
Complete Equipment for Concrete Block Plants

Improve moisture control, speed loading, save space with Neptune Auto-Stop water meters. Set by pushing buttons; meter cuts off automatically. Excellent reputation for sustained accuracy and trouble-free operation. *Ask for Bulletin 562 WRP*

NEPTUNE

Automatic Water Meters...

FOR READY-MIX PLANTS AND BLOCK PLANTS

NEPTUNE METER CO., 19 W. 50th St., New York 20
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AIR ENTRAINED CONCRETE

ENTREX MAKES MORE DURABLE CONCRETE & CONCRETE PRODUCTS!

COSTS 1/2¢ PER BAG CEMENT

ENTREX: means a more workable, easier handling, more durable concrete — eliminates bleeding & segregation — gives finer surface texture — yields concrete products with less breakage, higher compressive strength and lower water absorption — gives quicker and easier cleaning of trucks & equipment.

ECONOMICAL — For Concrete: costs less than 3¢ per cu. yd.! — For Blocks & Shapes: costs less than 1¢ for every 30 units!

MEETS SPECIFICATIONS: ENTREX meets all government and ASTM specifications.

Write *Today* for full information, And a FREE sample!

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• PAINT AND PROTECTIVE COATINGS • WATERPROOFING COMPOUNDS • CONCRETE ADMIXTURES • ASPHALTIC COATINGS • CHEMICAL SPECIALTIES & RESEARCH

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FREE SERVICE for Buyers

Get information and prices quickly on machinery, equipment. Check item (or items) about which you desire information. Send to us.

*Specify type.

Send to: Research Service Department
ROCK PRODUCTS
309 W. Jackson Blvd. Chicago 6, Ill.

- ___Admixtures, Aggregate
- ___Aftercoolers, Air
- ___Agitators*
- ___Aggregates (special)*
- ___Air Compressors
- ___Air Separators
- ___Asphalt Mixing Plants
- ___Bagging Machines
- ___Bags*
- ___Barges
- ___Batchers
- ___Belting, Conveyor, Elevator, Power Transmission*
- ___Belt Repair Equipment
- ___Bin Level Indicators
- ___Bins and Batching Equipment
- ___Bits*
- ___Blasting Supplies
- ___Block Machines,* Concrete Building
- ___Bodies, Trailer*
- ___Brick Machines and Molds
- ___Buckets*
- ___Bulk Cement Handling Equipment
- ___Bulldozers
- ___Cars, Industrial
- ___Central Mixing Plants
- ___Classifiers
- ___Clutches
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- ___Concrete Forms
- ___Concrete Mixers*
- ___Concrete Mixing Plants
- ___Concrete Specialty Molds
- ___Concrete Waterproofing and Dampproofing
- ___Conveyors*
- ___Crushers*
- ___Coolers
- ___Cranes*
- ___Curing Equipment
- ___Derricks
- ___Dewatering Equipment, Sand
- ___Diesel Engines
- ___Dragline Cableway Excavators
- ___Draglines
- ___Dredge Pumps
- ___Drilling Accessories
- ___Drills*
- ___Dryers
- ___Dump Bodies*
- ___Dust Collecting Equipment & Supplies
- ___Electric Motors
- ___Engineering Service, Consulting and Designing
- ___Explosives & Dynamite
- ___Fans and Blowers
- ___Feeders*
- ___Fifth Wheel, Heavy Duty Special
- ___Flotation Equipment
- ___Front End Loaders*
- ___Gasoline Engines
- ___Gear Reducers
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- ___Gypsum Plant Machinery
- ___Hard Surfacing Materials
- ___Hoists
- ___Hoppers
- ___Kilns: Rotary, Shaft, Vertical
- ___Locomotives*
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- ___Magnetic Separators
- ___Masonry Saws
- ___Mills*
- ___Pipe*
- ___Pumps*
- ___Scales*
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- ___Scrubbers: Crushed Stone, Gravel
- ___Shovels, Power*
- ___Speed Reducers
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- ___Trailer Dump Bodies
- ___Trucks, Bulk Cement
- ___Trucks, Industrial
- ___Trucks, Mixer Body
- ___Trucks, Motor
- ___Valves
- ___Vibrators
- ___Welding and Cutting Equipment
- ___Winches
- ___Wire Rope

If equipment you are in market for is not listed above, write it in the space below.

Your Name_____ Title_____

Firm Name_____

Street_____

City_____ State_____

RP-6

WHERE TO BUY

MULTIPACK, INC.
MULTIPLEX MACHINERY DIVISION
7400 GRAND DIVISION AVENUE
CLEVELAND 25, OHIO
Telephone—BRoadway 1-2920

Recent trade-ins on our new high-production Multipack No. 3 "Blockmasters" can be purchased on deferred terms. All Equipment guaranteed. Write or call for details.

LOT 103 (Can be seen in operation.)
- **1—Multico No. 2 Blockmaster (two block per cycle) and Electric Off-Bearer**
- **5—Mold Boxes—equipment for 4", 6", 8", 10", 12", 8" F.H.A. and chimney block**
- **1,800—Steel Pallets, 18" x 19" x 1/8" 42—Racks, 72-block capacity**

LOTS 106-7-8 (One can be seen in operation)
- **3—Multico No. 3 Blockmasters (three block per cycle)**

LOT 109
- **1—Multico No. 3 Blockmaster (three block per cycle) with Front-End Loader, Automatic Pallet Feeder and Hydraulic Off-Bearer.**

LOT 110
- **1—Multico No. 3 Blockmaster (three block per cycle) with Electric Off-Bearer**
- **6—Mold Boxes: 4", 6", 8" and 12".**
- **1,500—Steel Pallets, 18½" x 26" x 5/16" 70—Racks, 72-block capacity**
- **1—30 Cu. Ft. Mixer**

INVESTIGATE—Put yourself in a competitive position.

SILENT VIBRATING TABLES FOR CONCRETE PRODUCTS

ALSO, METAL MOLDS FOR SPLASH BLOCKS, STEPPING STONES, CHIMNEY CAPS, and "IDEAL" Combination Step Molds

For Details Write to: **R. L. SPILLMAN CO.**
18 W. Merrill, Columbus, Ohio

FOR SALE OR TRADE

Make us an offer on the following:
1. One late model CTM 2 yd. mixer in good working order.
2. One late model CTM 2 yd. transit mixer. Needs some repairs.
3. One 2 yd. capacity Jaeger horizontal type transit mixer with separate engine drive, in good working order.
4. One Homestead portable steam generator in A-1 condition, complete with hoses.

Will consider any reasonable cash offer, or will trade for concrete forms, or other equipment for making concrete masonry products, or on small capacity gravel plant.

CONCRETE, INC.
P. O. Box 432 Rogers, Ark.

USED EQUIPMENT FOR SALE

Syntro-Pac fully automatic two block machine complete with pallet feeder, 10 H.P. air compressor, front end conveyor, two pallet off-bearer, five new mold assemblies and five molds that were currently being used. This machine averaged 415 8" block per hour the last month it was used.

Stearns Clipper stripper Model C 84 with one 8x8x16 attachment and 1,000 pallets.

Van-U-Matic, plain pallet, two block machine with air operated off-bearer, 15 H.P. air compressor, 1,050—8/16 x 18 x 18 steel pallets, 4x8x16, 6x8x16, 8x8x16, 12x8x16 attachments with parts for corners, cash and halves, 18 cu. ft. mixer and 25' belt conveyor. In very good condition.

Preschak, two block, semi-automatic complete with 4 x 8 x 16, 6 x 8 x 16, 8 x 8 x 16, 12 x 8 x 16 attachments, approximately 700—6", 1,200—8", 1,600—4", and 1,000—12" pallets, a 21 cu. ft. Preschak mixer and 16' belt conveyor.

Lith-I-Block plain-pallet, two block automatic, complete with off-bearer, 15 hp air compressor, 4x8x16, 6x8x16, 8x8x16, 10x8x16, 12x8x16, and chimney block molds with parts to make corner cash, etc., 1500 ⅛x18x18 steel pallets and 46—60 block racks. In very good condition.

Mid Atlantic Equipment Resale Co.
Box 273 Front Royal, Va.

USED BLOCK MACHINES

Stearns Zipper—Jefferson, Wisconsin.
Kent Blockmaker—Saginaw, Michigan.
Two-block Van-U-Matic molds, offbearer and steel plain pallets. $1500.00—Aberdeen, S. D.
Two-block Preschak with 4" — 8" — 10" — 12" molds and pallets. $1200.00.
Stearns Clipper — Conequenessing, Pennsylvania.
Three-block plain pallet Flam machine, reasonable—Chatham, Ont., Canada.
Besser K-12 with mixer, 3000 steel plain pallets and steel racks. $2500.00 complete—Cannon Falls, Minnesota.
Two-block plain pallet Multico complete with molds, offbearer, pallets and racks. $500.00 down—Mankato, Minnesota.
Jaltcrete No. 9 still operating—Rockford, Ill., Durham, Ont., Canada.
Jaltcrete No. 7—Quincy, Ill., Two Harbors, Minn.
Hydro-Korpac—La Porte, Indiana.
Flemings—Lith-I-Blocks—Columbias.
I also have on hand quite a supply of cored pallets, modular and full size, a few used mixers, boilers, conveyors and bucket elevators. Also I list a few plants that want partners with a little cash and lots of experience.

Mid-Western Concrete Equipment Co.
BOX 646 MUKWONAGO, WISCONSIN

COLORS ***For Cement and Concrete***

COLOR YOUR CONCRETE WITH LANSCO CEMENT COLORS, available in 40 ATTRACTIVE shades. Suitable for all types of concrete products. Write for our new color card, copy of "Suggestions For Using Cement Colors", and for free samples and price list.

Manufactured by:

Landers-Segal Color Co.
73 Delavan St. • Brooklyn 31, N. Y.

FOR SALE — BLOCK PLANT IN OPERATION FOR PAST 25 YEARS

Building Supplies, roofing and siding, and block plant. Located in County Seat, southern Michigan town with large farm trading area. Sale includes inventory; plant with Go Corp Jr. approx. 3 years old, attachments to make 8-inch and 12-inch blocks; lift trucks; 5 delivery trucks; office equipment; steam room; and lease on property. Gross sales over $150,000.00 yearly. Owner has other interests. Will require $40,000.00 to purchase. Plant to be sold as a complete unit. This is a going business.

BOX N-33, CONCRETE PRODUCTS
309 W. Jackson Blvd., Chicago 6, Ill.

SUCCESSFUL, OPERATING CONCRETE PRODUCTS PLANT FOR SALE IN CALIFORNIA

Besser block machine (Vibrapac) steam curing . . . A growing business in a growing area. Abundant supply of liteweight aggregates. For further details contact:

Box N-40, Concrete Products
309 W. Jackson Blvd., Chicago 6

FOR SALE

Complete Dunbrik and Duntile Machinery, original cost $40,000.00. Best offer around $5,000 gets it.

Box N-31, CONCRETE PRODUCTS
309 W. Jackson Blvd., Chicago 6, Ill.

FOR SALE

10,000 used steel pallets, 17" x 27" x ⅛" for Besser Cement Block Machine—$1.25 each, FOB Miami.

For further particulars communicate: Purchasing Department,

MAULE INDUSTRIES, INC.
3220 Biscayne Boulevard, Miami, Florida

PLAIN PALLETS CLEANED
IN YOUR PLANT
PALLET SERVICE CO.
R. 2 — Phone 3-3271 — Oxford, Ohio
We use Besser Equipment

Small Block Plant Owner

I have quite a supply of used machines that are replaced by larger plants who need larger production. Some of these setups are in very good condition. As they are a surplus to me, I will sell on any reasonable terms with payments as low as $50.00 a month.

Mid-Western Concrete Equipment Co.
Box 646 Mukwonago, Wis.

GOOD WILL BUILDERS

For the block manufacturer. Help your contractors and bricklayers get quicker, easier and straighter masonry construction with U.B. tools that carry YOUR advertising. U.B. Corner ties, Linestretchers, Line Pins and Twine. We also wholesale a full line of tools for the block layer. Write for catalog and prices.

UNITED BUILDERS
1822 Lindberg Drive
Muskegon, Michigan

Plant Layout Design Block Machinery

WITTEMANN MACHINERY COMPANY
FARMINGDALE, NEW JERSEY
Specialists in Concrete Products Equipment
Eastern Representatives of the
COLUMBIA MACHINE WORKS, Vancouver, Washington

Elevators Bins Conveyors Feeders

Markets are not merely people, but people who *buy*.
Advertise your used equipment in ROCK PRODUCTS

ALSO SEE WHERE TO BUY ADVERTISING ON OTHER EQUIPMENT IN ROCK PRODUCTS' GENERAL SECTION

WHERE TO BUY

BLOCK CUBER

Stearns-Warren yardhoist with 20' boom mounted on pneumatic tires. Will handle 4", 6", 8" and 12" blocks. Good condition. Cost $1700.00, will sell for $750.00

Concrete Products Co.
29 Folly Road, Ph. 3-7241, Charleston 50, S. C.

CONCRETE BRICK COLORS
CEMENT COLORS
MORTAR COLORS

made by
BLUE RIDGE TALC CO., INC.
Henry, Virginia

FOR SALE

Lintel machine 4 months old $1200.00. Racks and Pallets optional.

EDWARD CAMPBELL CO.
Box 428, Vineland, N. J.

FOR SALE

A complete set up with 30 cast aluminum molds and supplies for the manufacture of cement laundry trays or sinks both double and single size units. Must be disposed of fast at a special reduced rate of $4,000.

J. L. ALPERIN
109 West Brookline St., Boston 18, Mass.
Kenmore 6-8177

FOR SALE

Fork and platform power lift trucks, used and guaranteed factory rebuilts.

ERICKSON POWER LIFT TRUCKS, INC.
Saint Anthony Blvd. & University Ave. N.E.
MINNEAPOLIS 18, MINNESOTA
Phone—Sterling 1-9508

ROCK PRODUCTS

the Recognized Authority of the Non-Metallic Minerals Industry

FOR SALE

Complete farm drain tile plant and sand-washing plant with 60 acres of gravel deposit in one of the best territories of Southern Minnesota. Priced for quick sale.

BOX N-36, CONCRETE PRODUCTS
309 West Jackson Blvd., Chicago 6, Ill.

PLAIN STEEL PALLETS

Guaranteed Quality
Flat • Square • Accurate

GARY STEEL SUPPLY COMPANY
2300 S. Springfield Avenue, Chicago 23, Ill.
CRawford 7-2323

FOR SALE

2 Van U Matic 2-block, plain pallet machines, and offbearer, complete. Rebuilt molds for 16" or 18" blocks. Asking price $1100.00 each.

WILLIAM HAGAN
2nd & Fairview Ave., Fernwood, Penna.
Phone Ma. 6-3477

FOR SALE

3—Pallet returns for Besser Vibrapac Block Machine.
3—Off-bearing hoists for Besser Vibrapac Block Machine.
Off-bearer handles 2 pallets at a time.
Priced for Quick Sale—Call or Write
ANCHOR CONCRETE PRODUCTS, INC.
2450 William St., Buffalo 6, N. Y.
Grant N. Reinhold — HUmboldt 2188

KEEP ABREAST WITH
INDUSTRY TRENDS
THROUGH
ROCK PRODUCTS

Machinery and Equipment Wanted

Continuous-mix pugmill, with or without drive. Aggregate bins and cement bins with feeders.

Pozzolan Products Co., Inc.
228 N. LaSalle Street, Builders Bldg.
Chicago, Illinois

FOR SALE — 1 - BLOCK MACHINE $350.00

Besser Multi-Mold Sizes:
4 x 8 x 16 uncored
4 x 8 x 16 cored
6 x 8 x 16
8 x 8 x 16 sash blocks
8 x 12 x 16 all modular size

B. H. RAGLAND
P. O. Box 342, Cartersville, Ga., Phone 8253

FOR SALE

Concrete Block Plant, Complete. Land and Buildings, on Highway 30. Business active. Moving out of State. Write

G. SCHARNHORST
LONEDELL, MISSOURI—Call St. Clair 336 J 2

FOR SALE

Drain Tile Machine—Dunn Automatic No. 102 with 4 station hand operated turntable, 15 H.P. 3 phase motor, setups for 3", 4", 5", 6", 8", 10" and 12" drain tile. Used 18 months—in A-1 condition.
1—16 cu. ft. Dunn Mixer in fair condition with 7½ H.P. 3 phase motor.

BOX N-44, CONCRETE PRODUCTS
309 West Jackson Blvd., Chicago, Ill.

Try A Small Ad

For Quick Results

COLOR YOUR CONCRETE!
SMITHKO

LIMEPROOF CONCENTRATED DRY COLORS
Write for samples and literature—"Getting Results With Color in Concrete and Cement Products"
SMITH CHEMICAL & COLOR CO.
53 JOHN ST. BROOKLYN 1, N. Y.

FOR SALE—Small precast plant established in 1947 in best industrial and farming section in Western Kentucky. Town population 18,000. With or without real estate. Equipment includes two steel septic tank forms, monorail delivery truck, Champion drain tile machine, two mixers, two chimney block machines, electric hoist, forms for grease traps, sewers, yard furniture and many other salable items. No near competition. $5,000.00 will handle equipment and stock.
BOX N-39, CONCRETE PRODUCTS
309 West Jackson Blvd., Chicago 6, Ill.

FOR SALE

Three yard Rex truck mixer mounted on Ford Tandem (10 wheel), motors recently overhauled, in daily operation, having to purchase larger mixers.

Williams Ready Mixed Concrete Co.
Martinsville, Virginia

FOR SALE

Bros Lectro-Lift Assembly complete with 128" Truck Bed. Used only two months. Priced for quick sale.

Linton Concrete Products
528 Young St., Tonawanda, N. Y.

WANTED

Used Model 50-1 Stearns Block Machine. Must be in good condition.

BOX N-22, CONCRETE PRODUCTS
309 West Jackson Blvd., Chicago 6, Illinois

WANTED TO BUY

Gravel plant—prefer small capacity rotary screen type, with or without power, bin, crusher, or handling equipment. Tell us what you have.

CONCRETE, INC.
P. O. Box 422 Rogers, Ark.

WANTED

Used Bulk Cement Bin and Screw Elevator, 750 Barrel Capacity.

BOX N-21, CONCRETE PRODUCTS
309 West Jackson Blvd., Chicago 6, Illinois

WANTED — MANAGER FOR READY MIX COMPANY

Year around operation in completely modern Northern Illinois plant. Must have experience. Write complete qualifications to:

BOX N-41, CONCRETE PRODUCTS
309 West Jackson Blvd., Chicago 6, Illinois.

EMPLOYMENT OPPORTUNITY FOR BLOCK PLANT SUPERINTENDENT who is fully qualified to manage production of block plant in the southeast. Write stating age, previous experience, capabilities, and salary expected. This is a tremendous opportunity for a capable, hard working, ambitious man.
BOX N-27, CONCRETE PRODUCTS
309 W. Jackson Blvd., Chicago 6, Illinois

SITUATION WANTED: Engineer, Mech., 35, presently employed. Project leader with cement, lime, quarrying and conveying machinery manufacturer and plant designer. Solid background in heavy machinery, hoisting equipment, hydraulics, plant layout, wants a situation with a stable operation where engineering and organizational skills count. BOX N-42, CONCRETE PRODUCTS, 309 West Jackson Blvd., Chicago 6, Ill.

ALSO SEE WHERE TO BUY ADVERTISING ON OTHER EQUIPMENT IN ROCK PRODUCTS' GENERAL SECTION

YOU LIKED THE truck-man 40

BUT THE Y-40 IS EVEN BETTER!

We took your suggestions and reworked the Model 40 into a vastly improved truck, the Y-40. The 40 was designed for block handling. The Y-40 is your improvement.

NEW—Rigid mast fabricated of channels rolled especially for lift trucks—built to last indefinitely.

NEW—Transmission has four speeds, forward or reverse. Speeds to 20 mph. in either direction • Saves time and turnarounds on long or short hauls.

NEW—Narrow or wide drive axles with single or dual wheels • A combination to fit any conditions.

NEW—7.50 x 15, 10 ply Road Lug pneumatics on the drive and 6.00 x 9, 10 ply pneumatics on the rear assure maximum traction and footing.

NEW—Power steering at small extra cost.

PLENTY OF OTHER IMPROVEMENTS TOO

But we kept the features that made the 40 outstanding • Powerful 4 cylinder Ford Industrial valve-in-head engine • Oversized clutch • Timken-Detroit drive axle • Honed hydraulic cylinders • Welded frame • Forks in many sizes and styles and special attachments for bulk materials and awkward pieces • Plenty of free lift for working in kilns • Tilting mast and optional side shifter for effortless cubing • Ample underclearance for humps and bumps • Ready accessibility to all wear parts.

For paved yards or indoor work, ask about the new two ton Model W-40.

WRITE TODAY FOR FURTHER INFORMATION ON EITHER OR BOTH OF THESE NEW TRUCKS. EVEN WITH THESE EXTRA FEATURES TRUCK-MAN COSTS LESS.

truck-man
DIV. OF THE KNICKERBOCKER CO.
650 LIBERTY ST., JACKSON, MICHIGAN

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19 MEN WITH BUT A SINGLE MISSION . . .
TO HELP LITH-I-BLOCK USERS MAKE MORE MONEY

Conveniently located all over the country, they are at your call for help, advice or instruction

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BONUS QUALITY
LITH-I-BLOCK
MADE ONLY ON THE LITH-I-BLOCK MACHINE

SEND THE COUPON — GET THE DETAILS ON HOW THEY CAN HELP YOU

ONE PIECE OF EQUIPMENT OR A COMPLETE PLANT LAYOUT

LITH-I-BAR CO.

HOLLAND, MICHIGAN

SALES AND SERVICE THE WORLD OVER

LITH-I-BAR CO. **HOLLAND, MICH.**

I want to know more about the Lith-I-Block story — send bulletins 101-3

Name_____ Title_____

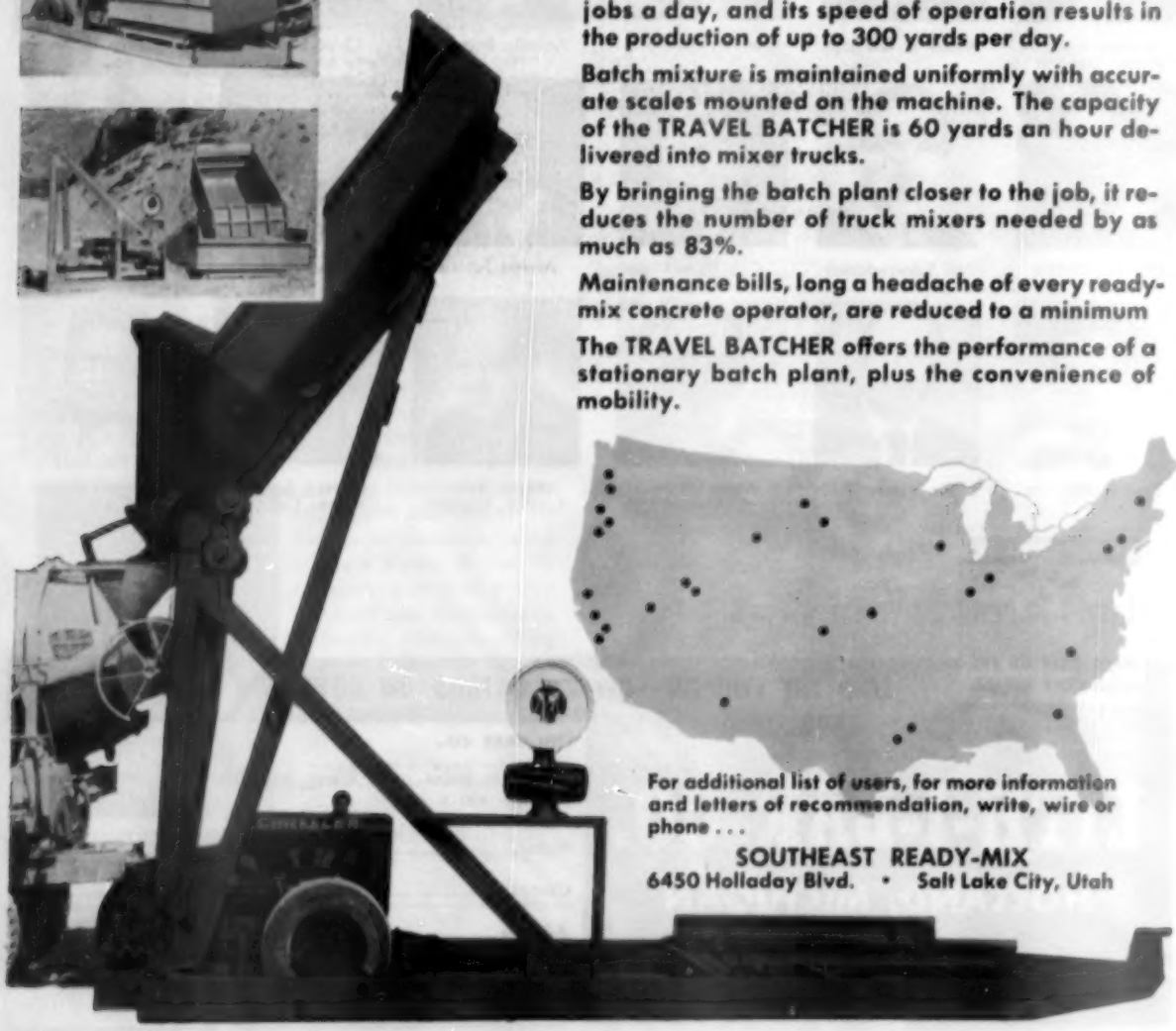
Company_____

Address_____

City & State_____

Moving Day
is no problem with
TRAVEL BATCHER

The hopper can be recharged with either a dump truck or a front-end loader, and can be used with 3-, 4-, or 5-yard mixers.



MOVING DAY is no problem with the new on the job TRAVEL BATCHER. Instant maneuverability makes the TRAVEL BATCHER available for several jobs a day, and its speed of operation results in the production of up to 300 yards per day.

Batch mixture is maintained uniformly with accurate scales mounted on the machine. The capacity of the TRAVEL BATCHER is 60 yards an hour delivered into mixer trucks.

By bringing the batch plant closer to the job, it reduces the number of truck mixers needed by as much as 83%.

Maintenance bills, long a headache of every ready-mix concrete operator, are reduced to a minimum

The TRAVEL BATCHER offers the performance of a stationary batch plant, plus the convenience of mobility.

For additional list of users, for more information and letters of recommendation, write, wire or phone . . .

SOUTHEAST READY-MIX
6450 Holladay Blvd. • Salt Lake City, Utah

The Word We Dreaded

My husband and I were together when the phone rang. He got up to answer it and I held my breath as I heard his quiet, "Yes, Doctor?"

Then he put the receiver down carefully. His face, when he turned to me, was gaunt and lined, but he was trying to smile.

"Was it—the laboratory tests?" I asked.

He nodded. "We'd better get my bag packed," he said gently. "They want me in the hospital this evening."

We had realized for months that something was wrong. But the pressure of his business postponed action. "Guess I'm a little off my feed," was all he would say.

It took our family physician only ten minutes to change that attitude. He made an immediate appointment with a specialist. And at the end of an anguished week we knew. The laboratory tests confirmed the word we dreaded—"Cancer."

That was a year ago. Modern cancer research saved my husband. That... and the surgeon's skill, the strength of our faith and his own fighting heart. He is alive and well today. For us the story has had a happy ending.

Yet it *isn't* ended. When we think of the thousands of other families tragically broken every year, we feel we still have work to do. Many types of cancer *can be cured* if caught in time.

We tell our friends, "If there are symptoms you don't understand, see your doctor at once." And we *give* to support the constant research of the American Cancer Society in finding the causes and reducing the incidence of cancer.

Strike back at CANCER . . . man's cruelest enemy . . . GIVE

American Cancer Society

GENTLEMEN:

I want to help conquer Cancer.

☐ Please send me free information about Cancer.

☐ Enclosed is my contribution of $_____ to the Cancer Crusade.

Name _____

Address _____

City _____ Zone ____ State _____

(MAIL TO: CANCER, c/o your town's Postmaster)

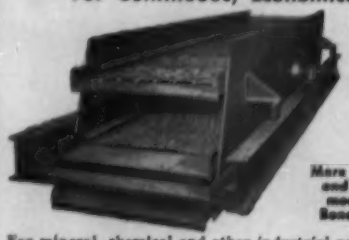
WHERE TO BUY

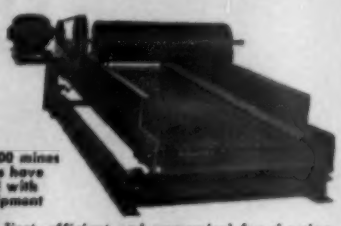
BONDED SCREENS-CONVEYORS-IDLERS BELTING - FEEDERS - REDUCERS

WRITE, WIRE OR PHONE — IMMEDIATE SHIPMENT FROM OUR FACTORY

NEW BONDED® HEAVY DUTY VIBRATING SCREENS

"For Continuous, Economical Screening of High Tonnages"





More than 5000 mines and quarries have modernized with Bonded equipment

For mineral, chemical and other industrial products. Fast, efficient and economical for cleaning, sizing, grading, dewatering. Made in all metals including stainless steel. Enclosed models for hot materials or dust control. Bonded screens are built for any screening operation, wet or dry. HEAVY DUTY MODELS: 4-bearing, positive throw, eccentric shaft; 3'x8' to 5'x14', 1 to 5 decks. TYPE A SCREENS: eccentric weight mechanism, spring mounted, 1 to 3 decks, 3'x6' to 5'x8'.

Heavy Duty Screens from $1095.00 General Purpose Screens from $395.00

NEW BONDED® TROUGHING IDLER CONVEYOR BARGAINS

Complete Ready-Fab sections quickly and easily joined together on the job. We take our loss on our stock of short length belting. You can save as much as 50% on the BONDED CONVEYOR SPECIALS listed, with conveyor belting in two pieces. Conveyors are equipped with 5" roll diam. idlers and return rolls, 20" diam. head pulley and 16" diam. tail pulley mounted on 2¼" or 2-7/16" diam. shaft. Belt is new 4-ply, 28-oz. duck, ⅛" top rubber cover x 1/32" bottom cover and is fresh stock made by leading manufacturers.

CONVEYOR PRICES INCLUDE BELTING

Belt Width	Length of Conveyor	List Price	Sale Price
14"	25'	$1088	$ 632
14"	50'	1839	985
16"	30'	991	548
16"	45'	1785	937
16"	60'	2309	1170
16"	85'	3102	1558
18"	25'	1229	684
18"	45'	1839	1095
18"	60'	2384	1354
18"	85'	3209	1665
18"	100'	3704	1912
20"	25'	1265	713
20"	45'	1965	1060
20"	60'	2490	1330
24"	25'	1323	773
24"	45'	2062	1145
24"	60'	2617	1436
24"	100'	4097	2166
24"	150'	5397	2775
30"	25'	1421	847
30"	65'	3101	1718
30"	85'	3731	2144

Other lengths and belt width at bargain prices.

NEW CONVEYOR BELTING SAVE UP TO 28%

Heavy duty 4-ply, 28 oz. duck, ⅛" top rubber cover x 1/32" bottom cover rubber belting having high tensile strength, tough cotton duck, strong carcass and proper flexibility. For heavy boxes, bags and bulk materials. Troughs easily. Famous brands at deep cut prices. Fresh stock.

12 lb. to 15 lb. average friction pull. 800 lb. to 1000 lb. average cover tensile.

Width	List Price	Sale Price
14"	$3.23 foot	$2.50 foot
16"	3.64 foot	2.62 foot
18"	4.03 foot	2.90 foot
20"	4.42 foot	3.35 foot
24"	5.23 foot	3.76 foot
30"	6.39 foot	4.60 foot

16 lb. to 19 lb. average friction pull. 2500 lb. to 3000 lb. average cover tensile.

18"	$4.70 foot	$3.38 foot
24"	6.05 foot	4.36 foot
30"	7.43 foot	5.35 foot
36"	8.78 foot	6.32 foot

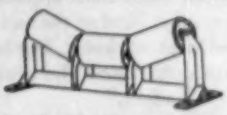
Additional widths and plies available at low prices. Write for free sample.

NEW BONDED® FEEDERS

For high tonnage and controlled feed of Aggregate, Sand, Gravel, Crushed Stone, Clay products, Metallic Ores, Coal, Cinders and almost any other bulk material to Crushers, Screens, Conveyors, Mills and other process machinery. Feeder may also be driven from tail shaft of Bonded® Troughing Idler Conveyors thus eliminating the necessity of two motors. Capacities to 60 tons per hour. Larger models available to 225 tons per hour. Full information in Bulletin 958. Write for it.

Priced from $280.00

NEW IDLERS AND RETURN ROLLS 25% BELOW LIST PRICE



3-roll, 5" diameter Troughing Idlers for

14" Belt..	$16.50	24" Belt..	$18.75
16" Belt..	17.25	30" Belt..	19.50
18" Belt..	18.00	36" Belt..	20.25
20" Belt..	18.25	48" Belt..	21.75

1-roll, 5" diameter Return Idlers for

14" Belt..	$ 6.38	24" Belt..	$ 7.50
16" Belt..	6.75	30" Belt..	8.25
18" Belt..	7.13	36" Belt..	8.75
20" Belt..	7.30	48" Belt..	10.25

All steel. Interchangeable with other well-known makes. Replaceable ball bearings. Either sealed type (pre-lubricated) or with alemite fittings. Rust proof ball races. Maintenance is negligible.

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60" x 48" to 6" x 3"

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25 ton Orton Diesel Locomotive Crane.
65 ton Porter Diesel-Elec. Locomotives.
44 ton GE Diesel-Elec. Loco., new 1942.
30 yd. Western & Koppel Air Dump Cars.
130 HP Amer. 2D Diesel Hoist & Swinger.
4 yd. P&H Elec. #1400 Quarry Shovel.
2 yd. Bucyrus Erie 51-B Diesel Shovel.
1¼ yd. Manitowoc 2000B Diesel Crane.
1200 CFM Ing. Rand XRE, 200 HP Compr.
50 Steel Dump Cars 36" Ga., 12 ton.

Mississippi Valley Equipment Co.

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48" x 60" Traylor Bulldog Jaw.
2—20" Allis Chalmers Superior McCully.
1—54" x 24" Pioneer Crushing Rolls.
222R Allis Chalmers Hydro cone.
42x16, 36x16 & 30x16 crushing rolls.
36x24 Jeffrey B 75 hp, 440 V. Hammermill.
3000 Ft. New 42" Conveyor Belt.
1—42" x 900' Link Belt Conveyor.

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15 ton diesel 60' Boom Whirley crane.
3—65 & 44 ton G.E. diesel elec. Locomotives,
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36" Telsmith Gysphere Standard Crusher.
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3'x10 Two Deck Telsmith Screen.
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1—Used 75C Hains Material Loader, Self-propelled, Gas Engine. Good Condition.
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CRUSHERS: 1218 Acme, 1836 Iowa part, 1624, 1636, 1536 & 2636 CR, 2540 Iowa part, 3042 Buchanan, 4836 Farrell, 4248 & 4860 Traylor JAW, 10, 14, 16, 20 & 36" McCully, 12K Gates, 16S, 20A & 48" Telsmith GYR. 2 & 2' CONE, 1634 Univ. & 18x42 Traylor DBL ROLL.
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¾ yd. Dragline, 40' boom, Caterpillar Diesel Power. A Bargain at $8500.

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½ yd. Trench Hoe, Chrysler gas power. Reconditioned and Guaranteed.

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¾ yd. Trench Hoe, 3 years old at $8500.

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New 75-Ton Aggregate Bin with aggregate Batcher, Scales, Cement Batcher with scales, collecting Hopper. Immediate delivery.

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Portable Crushing and Screening Plant, with Impact Crusher, Screen, Diesel Power, etc. at $20,000.

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1—12"x12" C.P., Class NSB 392'.
1—17" and 10"x12" C.P., Class OCB, 788'.
1—25"x15¾"x18", 1-R-PRE-2-2056', 3 phase 440/2300 V.

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1—90' DORR Bowl Rake Thickener.
1—24' DORR Bowl with 8'x32' rake.
3—DORR 8'x24', 2 deck, 2 section.

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29—SCREW, 6" to 24" D., 10' to 129' L.
29—BUCKET ELEVATORS, Belt and Chain Types, 25' to 100' high, bucket sizes from 3"x4" to 22"x19".
36—TROUGHING BELT, 14" to 30" wide, 22' to 264' lengths.
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1—15 ton American Terry steel derrick, 60' mast, 55' boom.

CRANES, HOISTS AND DERRICKS
1—15 ton Brown Hoist Locomotive Crane.
1—150 HP VULCAN size 72, single drum mine hoist.
15—I.R. and Sullivan 15 HP AC, 2-drum scraper hoist.
1—15 ton American Terry steel derrick, 60' mast, 55' boom.

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4—26" x 15" Sturtevant.
2—32" x 36" Edison.
2—36" x 36" Edison.

DRYERS
1—6'4½" D. x 12' L. Link Belt, Roto Louvre Dryer, Maehler oil heater.
1—6' Oliver Drum Dryer.
4' x 36' Christie Drum.

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800—½ to 700 HP, including Geared head motors and motorized speed reducers to 50 HP.

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6—Ore Skips.
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1—4'x8' Trommel Screen.
1—Ross Feeder.
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3—Wilfley, 2", 3", 4".
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27—Addt'l. Pumps, Centrifugal, Triplex, Vacuum, & Sump, up to 5650 GPM.

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35—Gardner Denver CF-79 Drifters.
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6—4'x10' Selecto.
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8—7'1" Dia. x 7'5½".
2—8' Allen Cones.
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3—14'2" Dia. x 17'.
5—16' Dia. x 27'.
3—28' Dia. x 30'.

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48—6'8" x 12'10½" steel frame with No. 6 enclosed head motion.

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Cedarapids 3240 5A primary unit. New condition.
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Cedarapids 5' x 12' feeder.
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60-ton, 2-comp., 5' x 12' storage bin w/slam gates.
Special bins to your specifications.
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18" dia. x 20" face magnetic pulley.

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Lorain 77, 1½-yd. diesel shovel. Good condition.
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3—40" Memco lifting magnets, used 2 months.

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600 cu. ft. Gardner-Denver diesel, rebuilt.
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24" x 20'—0" Single Screw Complete with steel box, extra steel motor support, v-belt drive, special back-gearing; 10 HP 1800 RPM 3-60-220/440 V Normal Torque Splash Proof ball bearing motor with base. New 1953.

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1—125 HP, 3/60/440V, 450 RPM Squirrel Cage Motor.
1—Complete Lime Hydrating Plant.
1—Complete Plant consisting of 4½'x40' Kiln, 5'x30' Cooler, Supporting Steel Framework, Motors, Fans, Dust Collectors, etc.
1—6 Williams Jumbo hammermill.

KILNS
1—4' x 40', 7' x 120', 8' x 125', 8' x 150' Kilns.

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1—42"x48", 40"x42", 36"x42", 30"x36", 24"x36", 18"x36", 12"x24" Jaw Crushers.
2—42"x16" Allis-Chalmers Crushing Rolls.
1—36"x16" Sturtevant Crushing Rolls.
2—24"x14" Rogers Iron Works Crushing Rolls.
1—24"x12" Farrell Bacon Crushing Rolls.
1—36" Telsmith Gyrosphere Crusher.
1—No. 222, 322 Allis-Chalmers Type "B" Hydrocone Crushers.
1—6", 10", 14", 16" and 20" McCully Superior Gyratory Crushers.
36"—20" Traylor T. Y. Gyratory Crushers.
No. 3 up to No. 12 Gyratory Crushers.

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1—7'x8', 6'x12', 5½'x10', 8'x6' Ball Mills.
2—5'x16'; 1—5½'x10'; 1—6'x12' Rod Mills.
2—5½'x20' Tube Mills.
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1—10'x48", 8'x48", 6'x22" Hardinge Mills.
3—3-Roll Bradley Hercules Mills, Direct Connected to 300 HP Motors.

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1—8', 14', and 16' Air Separators.
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Rotary Kilns, 5'x30', 7'x60', 7'x 64'6".

Rotary Dryers, 4'6"x40', 4'x25', 3'x24'.

Jeffrey Hammer Mills, 18x24.

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Shepard-Niles 4 ton Monorail Cranes with ¾ yd. bkts.

Trough Belt Conveyors—85' and 125' long.

Pan or Apron Conveyors—36', 85' and 150' long.

Bucket Elevators (12) 20' to 50' high.

Bins, Hoppers, Blowers, Pumps, Motors, Scales, etc.

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2—5'x30' Cummer 7/16" shell.
1—4'6"x50' Vulcan ⅜" shell.
2—3'10"x16' Link Belt Roto-Louvre.
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1—Raymond High Side Mill, 5 Roll.
2—Pennsylvania Model SXR-100, 100 Tons per hour.
5—Hardinge 4½'x16", 5'x22", 6'x22", 6'x 48", 10'x48".
3—Patterson 6'x8' Ball Mills.

CRUSHERS
2—Allis-Chalmers 10" Superior McCully Crushers, V-belt drive.
1—Allis-Chalmers K-9 Gates Gyratory Crusher.
10—Jaw Crushers 5"x6" to 42"x48".

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6—Tyler Hummer Screens 3'x5', 4'x5', 4'x7', 4'x10', 5'x10', 4'x15'.
1—Link Belt 3'x8' double deck screen.
5—Rotex 40"x24", 40"x120".
4—Air Separators 6', 8', 10', 14'.

OTHER ITEMS
2—Chicago 14"x7" Air Compressors, 434 cfm.
2—Oliver Rotary Dewaterers 8'x4'.
12—Bucket Elevators 20'x75' centers.
256 ft. Link Belt 12" Troughing Conveyor.
2400 ft. Joy 26" Troughing Conveyor.

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Tel: Cypress 2-5703

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2 Trucks, Autocar diesel Model DC20064-1SN, tandem dr., 200 H.P., 17 yd. rock dump bed.
1 Shovel, Lorain Model L-75-B, 1¼ yard dipper, diesel power.
1 Screen, 3' x 8' single deck Tyler Niagara, type 300.
2 Screens, 4' x 6' single deck Allis-Chalmers, Utah type.
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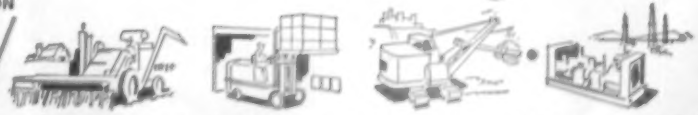

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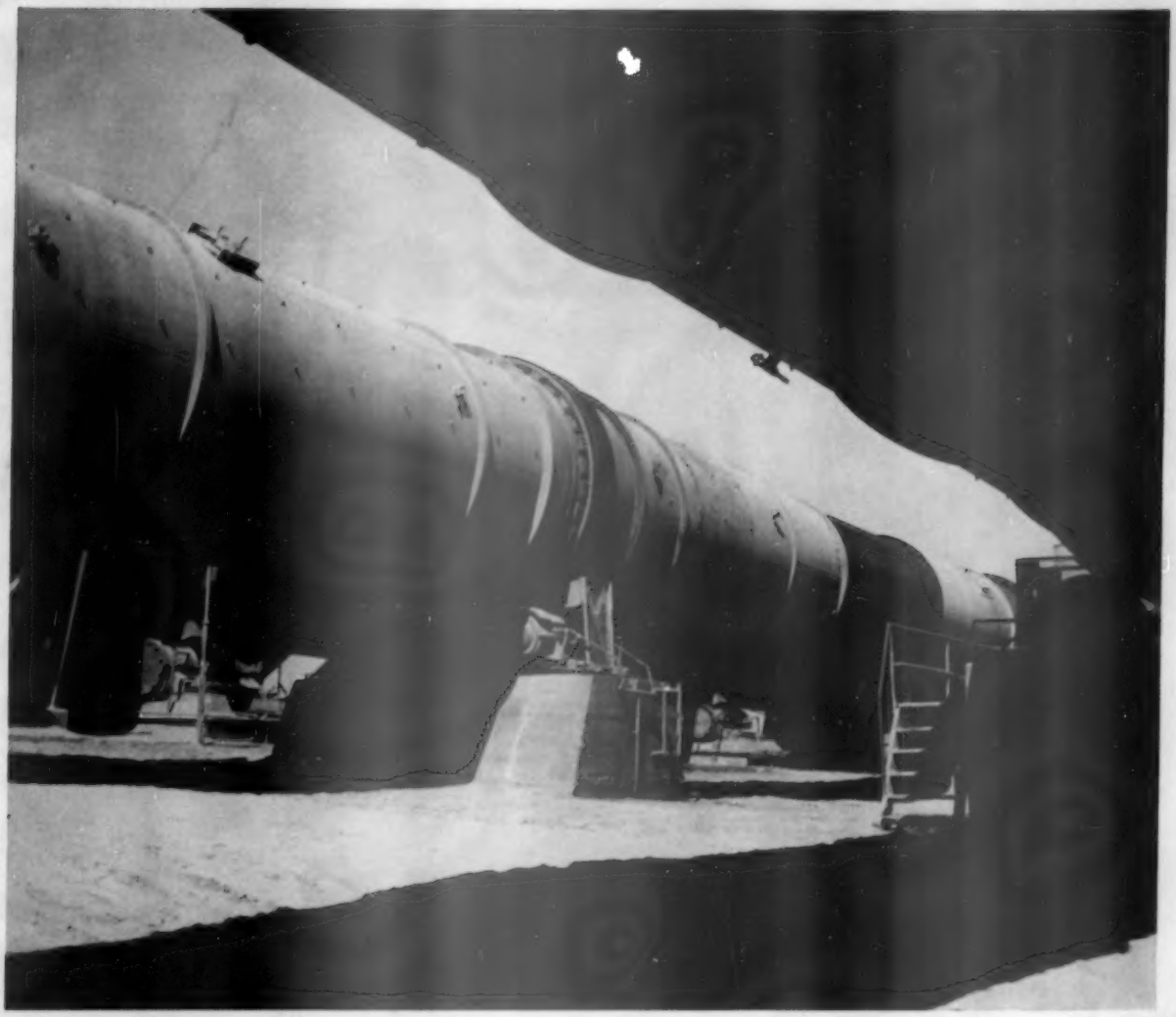

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